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UNITED STATES DEPARTMENT OF AGRICULTURE

BULLETIN No. 123

Contribution from the States Relations Service
A. C. TRUE, Director

Washington, D. C. PROFESSIONAL PAPER March 22, 1916

EXTENSION COURSE IN VEGETABLE FOODS

FOR SELF-INSTRUCTED CLASSES IN MOVABLE SCHOOLS OF AGRICULTURE

By

ANNA BARROWS, Director, School of Domestic Science, Chautauqua, N. Y., and Instructor, School of Household Arts, Columbia University

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WASHINGTON
GOVERNMENT PRINTING OFFICE
1916

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GENERAL SUGGESTIONS TO LEADERS.

Although the leader of this course does not need any more training than the other members, her special work will be easier if she reads at least a lesson ahead of the class work, or, better still, goes more or less rapidly through the whole bulletin in advance. In this way it will be easier for her to make wise suggestions regarding the materials to be used for the practical work in connection with each

Note.—This course is a revision of that published as U. S. Department of Agriculture, Office of Experiment Stations Bulletin 245. In its preparation the author cooperated with J. M. Stedman, Farmers' Institute Specialist, and with the Office of Home Economics, of the States Relations Service. The course is designed to aid agricultural colleges in their extension work. It is intended for the use of small groups of farm women assembled as a class to study the subject in a systematic manner with one of their number as a leader. It is adapted for such use in any part of the United States. The agricultural college is to loan the class the reference library listed in the Appendix and also a set of the apparatus designated therein. The class meets as often as convenient in a suitable room where tables for exercise work are available. The forenoon is devoted to the text and reference work and the afternoon to the exercise work, an entire day being thus consumed for each lesson. At the completion of the course and as often as desired the college conducts examinations through the leader and corrects and returns the papers.

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lesson and possibly regarding the order of some of the lessons. It is not essential that they be given in the precise order in which they are here presented and it may be desirable to change the order to meet local conditions. Some of the practice work, especially exercises which require several days to complete, may be done by the members of the class in their homes and the results discussed at the next meeting.

The leader should have at hand for use in every lesson these bulletins of the United States Department of Agriculture: Office of Experiment Stations Bulletin 28, revised edition, The Chemical Composition of American Food Materials, by W. O. Atwater; Farmers' Bulletin 142, Principles of Nutrition, by W. O. Atwater; Farmers' Bulletin 256, Preparation of Vegetables for the Table, by Maria Parloa; and Farmers' Bulletin 375, The Care of Food in the Home, by Mary Hinman Abel. One or two standard cookbooks are also desirable to provide variety in recipes, and more detail than can be given in these pages. The members of the group should be encouraged to consult any books in their homes bearing on the subject and to form the habit of using the dictionary and encyclopedias.

The queries at the end of each exercise are intended to aid in fixing the leading points in the students' minds. The majority of them have to do with facts brought out in the lessons, but some of them refer to matters which the student is expected to gather from experience and thought.

Plan the practical work carefully. For example, the fire must be ready and water heating while the vegetables are being prepared. Insist on careful weighing and measuring. Waste nothing.

By-products should be carefully used, or at least their possibilities noted, for conservation and efficiency should be watchwords in the kitchen quite as much as in business or national affairs.

LESSON I. CLASSIFICATION OF PLANTS.

A great variety of food plants are included under the term "vegetable," and there are many matters connected with their growth, selection, and preparation as human foods that are important in a study of their value and uses. The study of them may be conducted along a variety of lines, depending upon the use to which the information sought is to be put. For example, they may be studied with reference to—

(1) Their discovery and improvement by man.

(2) The parts which are desirable for food and their food value.

(3) The ways in which they are or should be handled and marketed.

(4) The cooking or other kinds of preparation necessary before they can be properly used as human food.

This course of study is more particularly along the line of the last item in this list—the culinary processes through which vegetables must pass before they can be properly utilized by the human body as food.

Few of the vegetables which are now man's main dependence were attractive in their original form, but most have been developed through centuries of cultivation and experiment. Cookery, as well as agriculture, has served to increase the number of plants available for food. "The number of inhabitants that can be supported in a country depends as much upon the art of cookery as upon that of agriculture; both arts belong to civilization," said Count Rumford, a pioneer in scientific food study. Primitive man gave little thought to agriculture, but took seeds, fruits, roots, leaves, and stalks, or fish and game, as nature provided them, thus satisfying his hunger and getting such variety as he could. In the division of labor between the sexes in early times the men were usually the hunters, and the women gathered, transported, and stored the simple forms of vegetable foods, including fruits and nuts, roots and seeds. The total number of kinds grown is very small compared to the total number of known plants; large markets offer hardly 50 varieties of vegetables, and most families use less than half this number.

CLASSIFICATION OF PLANTS.

To trace the common vegetables back to their sources would be interesting. Some have been known so long that it can only be guessed what land they came from or from what wild plant they were developed. More is known about others.

In order to describe and classify plants accurately botanists have adopted a system of Latin names for the principal forms and groups, and some familiarity with these is very helpful in studying this subject or even for reference to the dictionaries and encyclopedias.

There are many ways of classifying the plants which are useful to man. A simple plan is to divide them according to their uses into—

(1) Those that yield food for man, or for those animals which in turn are useful to man;

(2) Those which furnish materials for clothing and shelter; and

(3) Those which supply no material need, but add beauty to human surroundings.

The plants that are used for human food might be classified in several ways. One would be from the dietetic standpoint and would include, first, those used primarily for the sake of nutrients contained, and second, those used primarily for the sake of flavor or variety. Another classification would be according to the part of the plant used. This is a little difficult because in some cases several parts are eaten, but it is nevertheless worth considering. One of the

important groups under such a classification would be that which includes the roots or similar underground parts. To the botanist, there are important differences between such forms as true roots like sweet potatoes or parsnips, tubers like white potatoes and Jerusalem artichokes, root stalks or rhizomes like ginger, bulbs like onions, etc., but from the point of view of human food they may all be roughly classed together as root crops. They represent the store of nutritive material which the plant collects underground to draw on during its growth. Asparagus represents the use of stems as food. Sago, which is made from the pith of a species of palm, is an example of the use of a part of a tree trunk. In celery and rhubarb the leaf-stalks are the edible portion. Many kinds of leaves are used, both dried and fresh. Among the fresh ones may be mentioned lettuce, endives, spinach, and greens of various kinds. Dried leaves appear in tea and such flavoring matters as sage, thyme, bay, etc. Fewer flowers are used than most other plant forms. Cauliflower and globe or French artichokes, however, represent the undeveloped flower heads, while capers are pickled flower buds and cloves are dried ones. There is a great variety in the fruits and seeds used. Sometimes the preparations of cereal grains, such as hulled corn or hominy, rice, or macaroni and other pastes made of wheat flour, are served with meat like potatoes. Another important group consists of various members of the pulse family. Most important of these are peas and beans, some of which are eaten half ripe in their pods, some ripe and fresh, and some dried. Tomatoes, eggplants, and various members of the gourd family, such as squash, pumpkins, cucumbers, etc., are still other fruit forms used as vegetables. The seeds of mustard, celery, nutmeg, allspice, cassia, and various peppers are dried and used for flavoring.

THE COMPOSITION OF PLANTS.

Every plant may be considered a factory into which are carried substances from the air and the earth to be manufactured into other and very different products. In general, the processes which go on within the plants are those of upbuilding, the substances which enter being simple and those which are produced complex.

Some plants may be considered factories for the manufacture of food, others for textile fibers, and still others for fuel or building materials. Some serve several or all of these purposes. But whatever the use to which the plants are put, they all have certain common characteristics which may be learned from any work on botany.

Most foods include more or less refuse as well as the edible portion. Modern commercial enterprise separates much of the refuse before delivering foods to the consumer. In each lesson notice the small portion of the plant studied which is actually used as food.

The edible portion consists of water and four types of nutrients. (Figs. 1 and 2.)

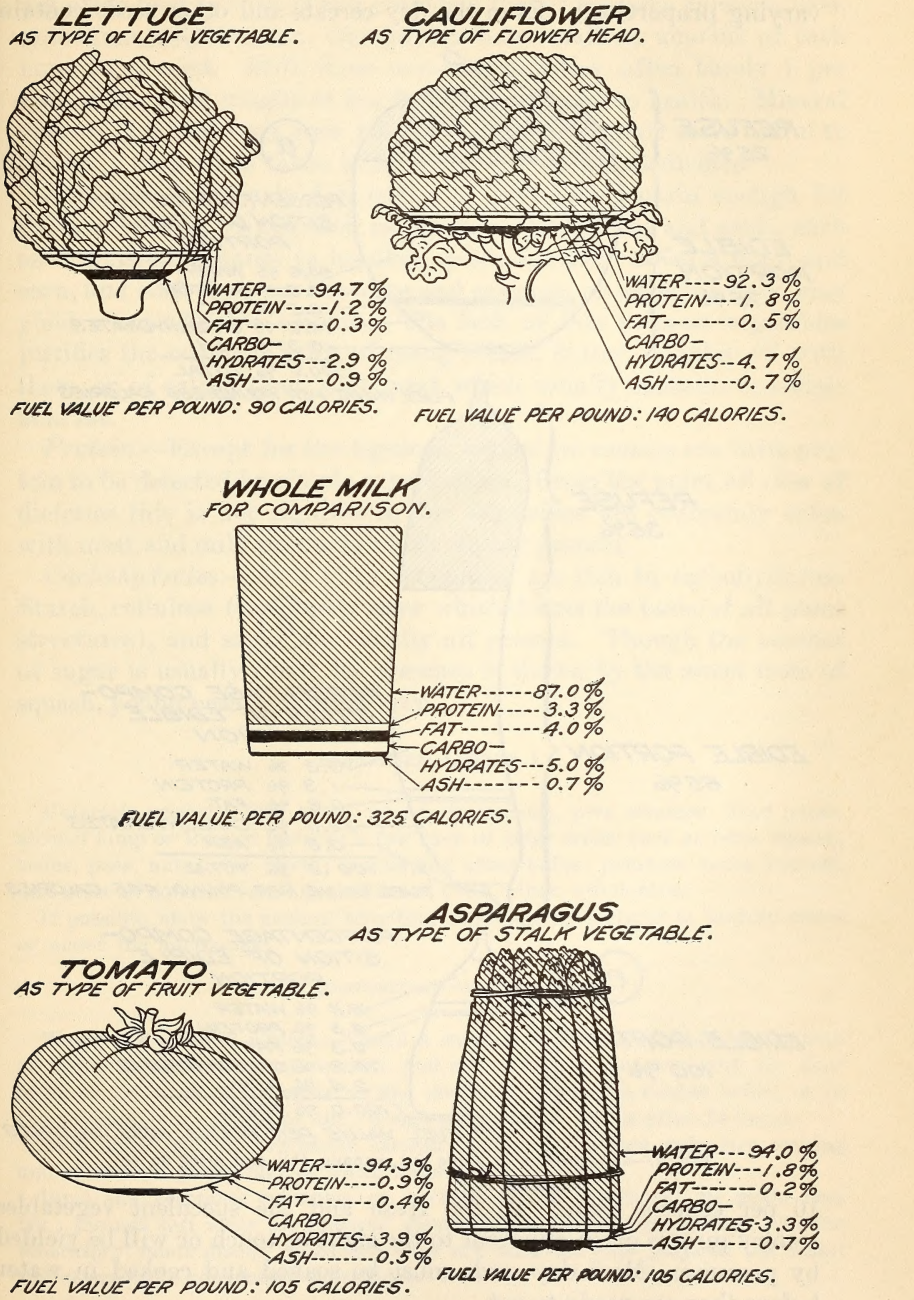

FIG. 1.—Composition of some succulent vegetables as compared with milk.

Water.—This substance, essential to life, forming over 60 per cent of the average human body, is present in almost all foods but in varying proportions. Even the dry cereals and other seeds contain

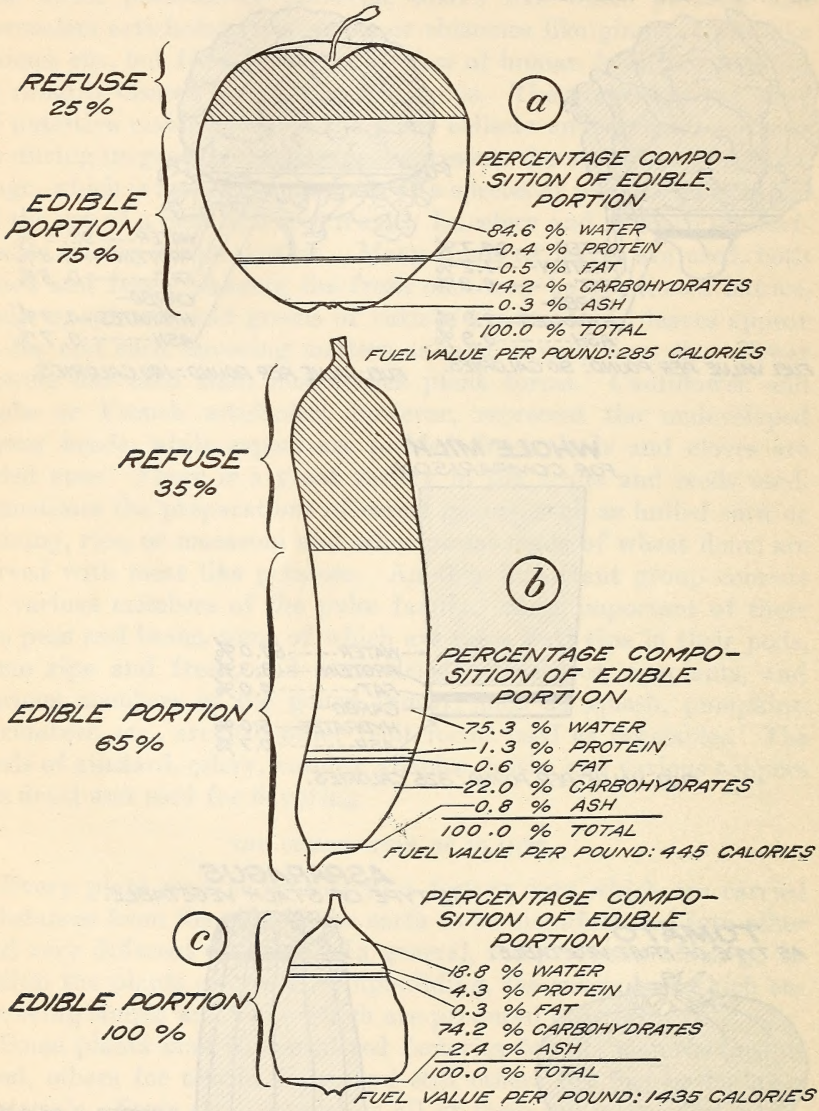

FIG. 2.—Composition of apple (*a*), banana (*b*), and dried fig (*c*).

10 per cent or more. In the fresh and the succulent vegetables watery juice is often apparent to the sight or touch or will be yielded by pressure. Most dry seeds must be soaked and cooked in water before they are ready to eat.

Mineral matter (ash).—In most vegetables the percentage of ash is higher than in grains. When one notes the small bit of ash remaining after food is burned and considers that it contains calcium, iron, potassium, sulphur, etc., one realizes how small an amount of each must be present. Still, these minute quantities, often barely 1 per cent of the total weight of the food, are essential to health. Mineral matters obtained from such foods are considered much more useful to the body than when taken in the form of "spring medicines."

Fat.—Comparatively few common vegetables contain enough fat to show readily. Nuts, such as pecans and coconuts, and seeds, such as cottonseed, peanuts (a beanlike seed commonly called a nut), and corn, and such fruits as the olive and avocado, or alligator pear, may yield a considerable amount. The lack of fats in most vegetables justifies the common habit of using cream, butter, or table oil with them, or of eating them with meat which usually contains considerable fat.

Protein.—Except for the legumes, vegetables contain too little protein to be detected by simple experiments. From the point of view of dietetics this is not significant, for vegetables are commonly eaten with meat and milk products which supply protein.

Carbohydrates.—As a class vegetables are rich in carbohydrates. Starch, cellulose (the woody fiber which forms the basis of all plant structures), and sugar are usually all present. Though the amount of sugar is usually small, its presence is shown by the sweet taste of squash, young peas, and green corn.

EXERCISES, LESSON I.

Materials needed.—Test tubes, paper, cheesecloth, wire strainer, filter paper, alcohol lamp or Bunsen burner; a few each of large seeds, such as corn, squash, beans, peas, nuts; ripe olives; onions and other bulbs; potatoes, beets, carrots, and piece of squash; small quantities of iodin, ether, nitric acid.

If possible, show the general structure of plants, by pictures or lantern slides or under the microscope.

COMPOSITION OF FOODS.

Water and mineral matter.—Weigh a small portion of a vegetable, slice thin or grate, spread on a shallow dish, and set to dry in the oven with the door open, on the back of the stove, in the uncovered part of a double boiler, or in the sunlight in a current of air. Weigh after 1 hour, again after 24 hours.

Soak dried fruit or vegetables, measure and weigh before and after soaking and reckon the percentage of water absorbed.

Burn any vegetable substance on a clean surface which can be made very hot; the ash left after all charcoal disappears is the mineral matter. In the laboratory small dishes called crucibles are used for this purpose, but small tin covers make convenient substitutes.

Weigh a potato; bake it, and weigh again after baking; put in the oven and allow it to turn to charcoal, and weigh again; then burn the charcoal, weigh the ash, and compare the result with the original weight of the potato.

Fat.—Crush nuts, ripe olives, or mustard seeds on blotting paper.

Put some peanut butter in a piece of cheesecloth and leave in the oven or in a water bottle until the oil separates.

If an equal volume of ether is added to ground flaxseed or peanuts and allowed to stand 10 minutes or more the fat will be dissolved in the ether. The liquid may then be filtered and left in a draft of air until the ether evaporates and the fat remains. The ether must be very carefully used as it is very volatile and inflammable. Do not use it near a fire or lighted lamp.

Protein.—Soak split peas for 24 hours or more, then heat in the same water. Skim the white froth and test that and some of the water with dilute nitric acid. The protein present becomes yellow when the nitric acid is added and the whole is heated. Treat egg white or milk in the same way for comparison.

A still simpler though less certain test for protein is the unpleasant smell given off when materials containing it are burned. Burned milk or eggs have a well-known odor, protein-rich seeds, such as beans or peas, burn with much the same smell.

Starch.—Grind peas or beans in a mortar or grate a potato or two, spread the ground material on a fine wire strainer or on a piece of coarse cloth, and pour water through a number of times. This will wash the starch through the strainer or cloth and it will settle in the water. Note that very little starch dissolves in cold water and that most of it settles. A drop of dilute iodin on raw starch gives a blue color. After starch is thoroughly cooked the blue color will not appear when iodin is added. (See also experiments under Lesson V, p. 30.)

Sugar.—Boil down the water in which carrots, beets, or squash have been boiled until it is a thick sirup; then test by tasting.

Evaporate further until it burns and compare the odor with that from burning sugar.

GERMINATION TESTS WITH SEEDS AND ROOTS.

Have some squash seeds soaked for 24 hours or longer. Split some open and find the seed leaves or embryo plant. Plant others and examine one or more each succeeding lesson, noting the differences as the embryo develops.

Try similar experiments with other large seeds, like peas, or kidney or Lima beans.

In the same manner experiment with sprouting potatoes or onions. After these have each been weighed and the weight recorded they may be put in earth or in a glass of water, or even wrapped in moist cloth or paper. Keep some away from the light and others in bright sunshine. Notice the changes from day to day and the gradual shrinking of the tuber or bulb as the sprouts develop; estimate loss of substance by appearance and by weighing the bulb or tuber (first cutting off the top or the sprouts) and comparing this with the original weight.

Cut the green top from a carrot; put the cut surface down in a glass of water, and place in the sunlight; in a few days small leaves will appear.

Chop raw spinach fine, press in a cloth, then heat the juice extracted. Dip or strain the extract from the water and combine with sugar to preserve it. The green coloring matter thus obtained may be reserved for tinting candies and ice cream. If cooked too long it loses its vivid green.

REVIEW QUESTIONS, LESSON I.

1. Give different methods of classifying plants.
2. Mention five of the principal plants most used in your home.
3. Describe the structure of some typical plant.
4. What is cellulose? What of its food value?
5. What proportion of some common plants is utilized for food? Give examples.
6. Report your personal observation in the germination of plants.
7. Describe the principal nutritive substances derived from plants.
8. How may the presence of each one of these substances be recognized?
9. Tell something of the changes produced by cultivation of plant foods.
10. What part have women had in the development of such foods?

LESSON II. LEAVES AND STALKS.

SALAD PLANTS.

There are many plants or parts of plants that may be eaten raw, the most important being the fresh green vegetables, such as lettuce, water cress, and celery. Such vegetables are generally relished and form a part of the diet wherever they can be obtained.

For the present purpose such vegetables may be called salad plants; but it is difficult to make an exact classification because so many of these plants are used in other ways than as salads, and because salads are often made of cooked vegetables, meats, etc. Lettuce, for example, a vegetable which in this country is most always eaten raw, in Europe is often cooked, and thus it becomes a potherb as well as a salad plant. Water cress, though often used as a salad, is sometimes used simply as a condiment or garnish. Peas, beans, potatoes, and vegetables such as spinach, which are most commonly served as "vegetables" are often put into salads. Some roots, as radish, and fruits, as cucumber, are also very commonly used raw as salads.

The whole matter will seem less confusing if what is meant by salad is exactly defined. Originally the word referred to a green plant rather than to a dish prepared from the plant, and its derivation indicates that it meant one which was to be eaten with salt. Now it is applied to a dish served cold with a dressing which always contains vinegar or other acid and usually some kind of oil or fat, and salt, pepper, or other seasonings. The basis of the salad may be vegetables, either raw or cooked, fruit, nuts, eggs, meat, or fish—in fact, almost any material or combination of materials of suitable flavor and consistency, and the dressing may be simple or elaborate.

This definition shows what a variety of salads it is possible to make. Many housekeepers in their search for novelties build up strange and ornate combinations, while others go to the other extreme and imagine all salads are foolish "new-fangled" things which it is a waste of

time to prepare. The former do not realize that the most satisfactory salads are usually the simplest; and the latter forget that fresh cucumbers served with oil and vinegar, or the "greens" left over from dinner and served cold with vinegar at supper, are just as truly salads as elaborate combinations of all sorts of fruit and nuts and mayonnaise dressing. Moreover, the fact that small quantities of different materials can be easily combined to make an attractive salad, shows that it is often an economical and sensible dish.

Returning to the vegetables which can be used raw in salads, that is, the salad plants, they are valuable because their freshness and attractive appearance arouse an appetite for the more substantial materials served with them. Moreover, in this shape the body gets all the iron, calcium, and other mineral constituents present, and also vitamins, as certain substances are termed which are needed in at least small amounts for normal growth and health, and which may be partly lost or perhaps rendered less useful by cooking. Hence the desire for such foods should be considered to represent a real need, and raw salad plants and fruits should be supplied freely. "Spring bitters," which the housewives of earlier days thought necessary, are more palatable when obtained from salads than from medicine bottles. Aside from any question of medicinal value, such plants help to make the diet attractive and give a relish to food, particularly in the spring, when one is weary of the limited variety of the winter table.

The distinctive salad plants are very succulent; that is, they consist very largely of water. This is the chief reason why they are especially refreshing in warm weather and give a pleasant contrast to the heavier dishes of a heavy meal. They also serve to prevent too great concentration of food, and thus aid in the digestive process.

It is a very common custom to combine fat with salad plants, fresh or cooked. Fat is a compact food and, weight for weight, is about two and a quarter times as valuable as protein or carbohydrate for fuel in the human body. A tablespoonful of oil would go farther toward supplying energy for keeping the human machinery running than a large head of lettuce. The world over people have instinctively added a condensed dressing consisting mainly of fat (oil, bacon fat, or cream) to the salad plants bulky with cellular tissue and water, and have eaten such salads with meat and bread which supply protein and carbohydrates.

The use of salad plants and salads as decorations on the dining table deserves consideration.

Green salad plants grow near the earth and so are likely to be soiled with dirt which may often be accompanied by bacteria and other living things, which cause disease. They should always be made clean before use. Water cleanses to some extent, but only

through intense or long-continued heat is it possible to check entirely the development of the microscopic forms of life—bacteria, yeasts, molds, etc.,—some of which make food decay and some of which cause human disease. Salad plants which can not be regarded as above suspicion would better be cooked than used raw. Many mysterious cases of disease doubtless arise from eating imperfectly cleaned green foods. Therefore unusual care is needed in the selection and preparation of foods which are not to be subjected to heat. Cress, lettuce, and other salad plants, carelessly cultivated or handled in the market and half cleaned in the kitchen, may transmit disease, as may milk, raw oysters, and other foods. Before washing, green vegetables should always be looked over carefully to make sure that any inferior portions, insects, or other undesirable things are removed.

The fashion of cutting down through a head of lettuce or celery, and serving it in lengthwise sections may give each person his fair share of the choice, tender portions, but can not be recommended, because it is practically impossible to cleanse the grooves of the leaves where they join the stem. Such plants should rather be separated into their natural divisions and washed in several waters, special attention being given to hollows in stalks and leaves. Sand, though unpleasant, may be less harmful than other things that may be left behind after washing; but its presence justifies the suspicion that the washing was not thorough or carefully done. Vegetables, such as spinach, which are difficult to free from grit, should be washed in many waters, and lifted out of the pan each time in loose handfuls before the water has been drained off. If the water is poured from the pan while the vegetables are in it, part of the sand falls back on the washed leaves. Salt in the water will aid in drawing out insects if they happen to be present. There is an advantage in washing all salad plants in running water, especially for the removal of insects. After washing several times and removing imperfections, salad plants may be kept in a cool place like a cellar or refrigerator for some hours or even a day before using. After draining off the last water, wrap the leaves or stalks in a cloth or put into a clean paper bag; that is more effective than keeping them in water.

The quality of vegetables may be greatly injured by insect pests and plant diseases. If the plant suffers severely from such enemies, it can not make normal growth, and so all or parts of it may be inferior. For instance, green peas or string beans from vines badly attacked by insects or by some fungus disease do not attain full perfection, and obviously, leaves used as greens are of inferior quality if worm-eaten. Insect pests and plant diseases are often controlled by the use of insecticides and in similar ways; if such things are used, there is all the more reason for washing vegetables thoroughly

before preparing them for the table, to remove any hellebore, copper salts, or other poison which may still adhere to them.

During the cleaning process it is advisable to sort out the coarsest portions to add to soup materials; the next best may not be attractive to serve by themselves, but can be cut or shredded for combination with other materials, while the best of all—the heart of the cabbage, celery, or lettuce—should be served in the least elaborate way with salt or a simple dressing.

No plan for serving salads should be encouraged which leads to a waste of food material. For example, if the outer portion of a cabbage is to be used for a salad bowl, dig out the center after cutting a layer from the top. Chop this fine, mix with dressing, and pack in the case of larger leaves which were left in place; later, any dressing adhering to these larger leaves may be washed off and they may be used for a scallop or soup. Many materials may be combined with the cabbage, celery, and lettuce in salad making; for instance, raw apples, pears, or radishes, or canned fruit, such as pears cut in slices or cubes.

Lettuce is the principal salad plant in this country both for use alone and in combination with other foods. There are many varieties, adapted to different conditions, but all may be classed under two general heads—the cabbage lettuce, where the heads are solid and compact, and the cos lettuce, where the leaves are long, loose, and sometimes less delicate. Romaine is an example of cos lettuce. There are also varieties with blanched centers and others with curly, dark-tinged leaves.

Other good salad plants are chicory and its near relative, endive, both of which are improved by being blanched for a few days before they are picked; corn salad or lamb's lettuce, a small plant often found in city markets; sorrel, wild and cultivated; some young and tender seaweeds; and many mild-flavored plants or weeds. Others are better for partial cooking, even if served cold as salads.

Celery in its wild state is an unpromising if not harmful vegetable; but by cultivation, and especially by blanching its leafstalks, it has been made into an excellent salad plant, sometimes said to have certain medicinal virtues. The fibrous outer stalks and larger white leaves of a bunch of celery should be reserved for soup making. Some of the larger stalks, too stringy to serve whole, may be cut up and used in salads, or if too tough for that, may be cut, cooked, and added to soups or served with white sauce, perhaps on toast. The tender inner stalks should be served plain to eat with salt. Sometimes the groove in the stalk is filled with prepared cheese. The center of the root is a delicate morsel. Leaves and root may be dried to flavor future soups. Celery exposed to contamination in unclean cars, markets, and wagons, must be carefully washed before it is safe

to eat. If wilted, the stalks should be separated and placed in cold water for an hour. They should then be washed and rinsed, wrapped in a cloth, and kept in a cool place. Do not scrape or trim them until just before serving.

EXERCISES, LESSON II.

Materials needed.—Any available salad plants, such as lettuce, dandelion, chicory, celery, chives, endive, escarole, cabbage, mustard, parsley, peppergrass, radish, romaine, water cress—as many types as possible. If only lettuce or celery can be secured, have one root for each student or group of students. Apples, cucumbers, etc., may also be used. For salad dressings provide olive, cottonseed, or peanut oil, sour cream, peanut butter, eggs, bacon fat, lemon juice, vinegar, and other seasoning materials, according to the recipes to be chosen from those at the end of this section.

Excursion.—If feasible, visit markets, farms, or gardens, or gather wild plants. Learn to recognize different salad plants and test their merits as raw foods, alone or with various dressings.

LETTUCE.

Weigh head of lettuce with the roots. Remove inedible portions and sort the leaves according to quality; weigh and estimate the percentage of refuse and relative values of each portion. Pull apart and wash each leaf thoroughly, dry on a cloth without bruising, then arrange in a salad bowl with the larger perfect leaves outside and the tender ones in the center. Torn but otherwise good leaves may be rolled or folded and cut in shreds or ribbons for other salads.

CELERY.

In the same way clean, weigh, and estimate values of all parts of celery, including the root. Reserve tough stalks, portions of the root, and coarser white leaves for use in soup stock in some succeeding lesson (V or XI). The tough outer fiber sometimes may be pulled or scraped off. Sort celery like lettuce, reserving tenderest portions to serve in simplest form. If there are enough of the green and the tender white leaves, cook them for greens. Lettuce leaves may be combined with them, if desired. The larger green leaves have too strong flavor for this purpose. Cut the larger, coarser stalks into lengthwise strips and then into quarter-inch slices. Let these stand in a French dressing for an hour or more, then combine with lettuce, nuts, apples cut into dice, or other material, or serve in a hollowed apple or tomato. Section of cabbage or cucumber may be used in this way when celery is not available.

CABBAGE.

Cut a portion of the stem from a cabbage, put the cabbage into a dish of water, and cover with a cloth. In 24 hours it will be much crisper, having absorbed water like any withered plant. Take a small, light-weight cabbage, turn back the leaves, and compare with a head of lettuce and with a cabbage of similar size, but weighing twice as much. Cut a cabbage into quarters, take out the inner third of each section and serve as a salad. Sometimes the inner cabbage leaves are tender enough to serve whole like lettuce, but usually they should be shaved with a knife or vegetable cutter or chopped. The coarser outer leaves may be reserved for soup or scalloped cabbage. (See Lessons III and XI.)

SALADS AND SALAD DRESSINGS.

Various salad dressings may be made in this lesson, and some reserved in glass jars for future lessons. The cooked dressings may be taken up later. In this lesson prepare the simplest types, like the following:

French dressing: To each tablespoonful of oil add a few grains of pepper and a little salt, blend thoroughly, and then add slowly one teaspoonful of lemon juice or vinegar.

Nut dressing: Dilute peanut or other nut butter with lemon juice and vinegar and a little water. Season with salt and pepper.

Cream dressing: Beat thick cream, sweet or sour, with an egg beater until stiff. Season with salt, pepper, and lemon juice or vinegar. Continue the beating while gradually adding the acid.

REVIEW QUESTIONS, LESSON II.

1. Mention five plants commonly eaten raw.
2. What of the possible medicinal value of raw foods of this kind?
3. What food materials are most abundant in salad plants? What do they lack?
4. Mention special characteristics and describe the preparation of three of the most common salad plants.
5. Explain importance of cleaning such food materials.
6. How may these leaves and stalks be kept in good condition for the table from one day to another?
7. Why are oils or other fats usually combined with such plant foods?
8. Give directions for dressing a salad with olive or other oil.
9. What are the usual ingredients in a cooked salad dressing? Give reason for the use of each.
10. What are the decorative possibilities of a salad?

LESSON III. LEAVES AND STALKS—Continued.

GREENS OR POTHERBS.

Closely associated with the plants that are eaten raw are a host of leaves and stalks commonly cooked and served under the general name "potherbs" or "greens." The latter suggests the instinctive desire which the dwellers in the temperate climates have to utilize the first green tips which appear in the spring and which were especially welcome after the monotony of the old-fashioned winter diet. Notwithstanding the low fuel value of such foods, the discerning housewife recognizes the necessity of supplying her family bountifully with this type of food, particularly because, as was stated in the lesson on salads, these green foods supply valuable mineral matter (iron, potash, lime, etc.), and vitamins as well as some protein and energy in the early spring, and these are valuable ingredients even when they must be purchased at the city market prices. A wide variety of plants both wild and cultivable are usable in this way.

WILD PLANTS USED AS POTHERBS.

A double purpose may be accomplished in the country home by the use of such wild greens, namely, freeing the grounds from some com-

mon weeds and providing food. Some of the wild plants which may be used in this way are here described.

The top of the common dandelion is used for greens before the flower bud has expanded. When it is desired to root out the plant from a lawn, the entire root must be dug up; if simply the top is cut off, the dandelion grows again and in a larger head. The slightly bitter flavor of the young tops is not disagreeable. The roots furnish a bitter extract often used medicinally, particularly in the domestic medicine of early times. When cultivated the dandelion is milder and more tender and may be used as salad, as may the very young wild plant. Cultivated dandelions may be blanched by covering them for a few days. A special bed may be set apart for this plant in the garden, but seeds should not be allowed to ripen and scatter.

The milkweed, cut when less than 6 inches high and before its leaves have fairly unfolded from the stalk, is considered almost as good as asparagus, and may be used to extend a scanty supply of the latter. The young milkweed stalks and leaves are also good when cooked like spinach.

The sour sorrels, so abundant on poor soil, may be added to soups or salads, and the larger leaves of the cultivated varieties make excellent greens. The garden sorrel is easily grown.

Chicory, which is a common weed in many places, furnishes excellent greens, much like the dandelion, only rather more bitter.

The cowslip or marsh marigold is sufficiently abundant in some regions to serve as a food plant, and is prepared like spinach or other greens.

Poke sprouts are a favorite potherb in some regions of the Southern States and are on sale in the spring in many southern cities. The young shoots are cooked and served like asparagus.

Purslane or "pusley" is one of the most common weeds now, yet 200 years ago it appears to have been cultivated as a potherb and to have been brought from the East to Europe as a salad plant. It is best when well developed, but just before it blossoms the roots should not be used. But little time is required for cooking its juicy, red, branching stems, which are not unlike beet greens in flavor.

Pigweed or lamb's-quarters, shepherd's-purse, plantain, and similar weeds are used in this fashion. Horse-radish tops are very fine greens, alone or mixed with other sorts.

Experiments with wild plants should never be tried unless one is sure that the plant is not poisonous, as there are some green plants like skunk cabbage, hellebore, and may-apple tops which are very dangerous.

CULTIVATED POTHERBS OR GREENS.

Among the plants cultivated especially for greens, asparagus is a general favorite. This is a member of the lily family akin to the

lily of the valley, and like this plant, will live on and on after it is once established. Many an asparagus bed does good service until the second or third generation of owners, and it is strange that any farm should lack this long-lived, easily cultivated delicacy.

Asparagus should be cut just below the surface of the earth before the bud begins to unfold and when the stalk is 6 to 8 inches above the ground. Wash well and scrape the lower end. Cook in boiling salted water until tender; fresh asparagus should not require 30 minutes. Overcooking injures the flavor and color as it does with all green vegetables. Season with melted butter or arrange on toast and season with butter and salt. A cream sauce is often served with asparagus and a cream soup may be made from the water in which the stalks are boiled.

Spinach is a favorite kind of greens and is seen in city markets most of the year. A French proverb calls it the "broom of the stomach," and it is richer in iron than most common foods. The tenderest leaves may be served raw as a salad. Excellent canned and evaporated spinach may be found in the larger grocery stores.

Beets are sometimes grown especially for greens, but more often surplus plants or surplus leaves are used for this purpose. The beet plants are often eaten when very small. The tops of the early bunch beets should always be used for greens and are palatable even when the stalk and leaf are 6 or 8 inches long. Swiss chard is a variety of the beet plant with thick leaf stems which is raised especially for greens. Turnip tops, cabbage sprouts, kale, collards, alfalfa tops, and pumpkin tops are sometimes used in this way. Carrots are also occasionally used as a potherb and, like parsley, are perfectly wholesome, but it should be remembered that some of the same family of plants (the parsley family) are poisonous.

Hop sprouts are seen in the foreign markets in March and April and are commonly canned. Care is taken to cut the sprouts so as not to interfere with the later growth of the vines.

The Japanese use young shoots of burdock as a potherb. They are better if blanched with earth for a few days before cutting. They should be parboiled, drained, and cooked again until tender, and served warm or cold with a salad dressing. Udo is another Japanese salad plant which is being tried in this country.

Onion tops: The bulbs and tops of young onions and the stalks and leaves of leeks are good greens, the onion tops being more commonly cooked with other greens than alone.

Fennel is used as a culinary vegetable in Europe and occasionally in American gardens. The leafstalk is thick and swollen toward the root, and thus becomes united almost like a bulb. It is cooked and served much like onions, and also eaten raw as a salad or a relish. The

finely divided leaves may be cooked like spinach, while the stalks may be cooked and served with white sauce like celery.

American housewives seldom realize that lettuce makes excellent "greens." This, as mentioned before, suggests a good way to use the tougher or outer leaves of the lettuce bought for salad and the surplus crop of the home garden. As is the case with all potherbs, lettuce should not be overcooked. The use of celery tops as greens, alone or mixed with lettuce, was introduced in the lesson on salad plants.

The cabbage tribe supplies many vegetables and is said to contain no harmful members. They have long been used to prevent scurvy. This group of plants now includes the white, red or purple, and Savoy cabbages, coleworts, Brussels sprouts, borecole or Scotch kale, cauliflower, broccoli, and others. To them the kohl-rabi is closely akin. The swollen stem which looks like a turnip growing aboveground is the part commonly eaten, though the leaves make excellent greens. The cauliflower is usually considered the most delicate of the cabbage tribe (see also Lesson VII); broccoli is similar in form but hardly equal in quality.

Collards or coleworts are similar to cabbage, but their leaves grow long and loose, instead of in a compact head. They grow where the climate is too warm for cabbages to head well.

Kale consists of curly, open leaves not forming a compact head. The dwarf green curled kale is thought by many to be the best for the table. It is cooked like cabbage. A very little soda (not more than a small saltspoonful) for each quart of kale added to the water in which it is cooked will preserve the green color and not injure the flavor. The blanched shoots of sea kale are prepared like asparagus and the flower heads are also used. The sprouts from cabbage stalks left in the ground over winter may be used in the same way. Like all green vegetables, kale, cabbage, etc., must not be overcooked, if they are to be delicate, wholesome, and at their best.

When cabbage and related vegetables are cooked an unpleasant odor and flavor is developed. This is prevented in large measure by cooking uncovered and in an abundance of water. It is also important that such vegetables shall not be cooked too long. Once it was considered necessary to cook cabbage several hours, but a young cabbage may be made perfectly tender in 20 minutes and an older one will not take twice as long. There is good reason to believe that overcooked cabbage is a cause of digestive disturbance, while rightly cooked it is not. If the white portion of cabbage or cauliflower begins to grow darker in color in cooking, it is a sign that it has been cooked too long.

Some of the cabbage tribe may be used raw as salads when young and tender.

Rhubarb is another plant in which the leafstalks are the useful portion, and may be described here, though it may from its use be classed as a fruit rather than as a vegetable. Because of its markedly acid flavor it is acceptable in the early spring, when it is at its best. Later in the season, when the stalks are tough and fibrous, the juice may be extracted for jelly making. Because it contains some oxalic acid the use of rhubarb is frequently forbidden to persons of gouty tendencies.

SEAWEEDS.

Several varieties of seaweeds are used as foods in different parts of the world, sometimes for flavor or supposed medicinal value and sometimes in place of gelatin. The commonest of these is Irish moss, much used in making blanc mange.

EXERCISES, LESSON III.

Materials needed.—Different greens according to season, such as spinach, cabbage, cauliflower, Brussels sprouts, asparagus, either fresh or canned; also butter, eggs, and salad dressing. A quart of Brussels sprouts and a peck of spinach are convenient amounts.

Utensils.—Saucepans for boiling vegetables, pans for washing, knives, colander, chopping bowl, and chopping knife.

The first step in the preparation of all these plants is thorough cleansing; sand is particularly obnoxious in greens; and though the boiling process might render most of the invisible dirt harmless, it is safer to wash them carefully. (See Lesson II.)

PREPARATION AND COOKING OF POTHERBS AND SIMILAR VEGETABLES.

Exercise 1.—Let each member weigh, trim, and wash several roots of spinach; weigh refuse, estimate the percentage of loss. Cook in slightly salted water till tender, or approximately 30 minutes. Drain, measure the leaves, and compare with original bulk.

Let each pupil prepare one of the following, and all results be compared:

(1) Cook spinach in its own juice, in covered saucepan.

(2) Cook in considerable water uncovered.

Serve 1 and 2 plain and compare their flavor.

(3) Cook; then drain, chop, rub through sieve, reheat, and serve with a little cream or white sauce made of 1 tablespoon butter, 1 tablespoon flour, and one-half cup milk. Melt butter in saucepan, add flour, salt, and other seasoning to taste, blend, stir until bubbling, but not brown. Gradually add milk, cold or warm. Cook until it bubbles and thickens, stirring constantly.

(4) Cook, drain, and chop; mold in cups, garnish with egg rubbed through strainer.

(5) Cream of spinach soup: Prepare spinach as in 3, then dilute to desired consistency with milk.

Exercise 2.—If possible, let each member prepare a different dish, one using Brussels sprouts, one cauliflower, one cabbage to be boiled plain, one cabbage with white sauce, etc.; in this way small quantities will serve for the class and all varieties may be cooked at the same time.

Prepare and serve boiled cabbage in the following ways:

(1) Plain with butter.

(2) With oil and vinegar.

(3) With white sauce.

(4) With white sauce and crumbs. Mix cabbage with half its measure of white sauce. Sprinkle with buttered crumbs, and bake until crumbs are brown.

(5) With white sauce, crumbs, and cheese.

(6) With sausage. Cook sausage thoroughly. Leave a little fat in the pan, put in chopped cabbage, and cook 5 to 10 minutes. Serve with the sausage.

(7) With potatoes (kolcannon).

(8) German cabbage. Stew chopped red cabbage in its own juices with an ounce of butter or other fat to each quart of the cabbage. Keep covered. This may be seasoned with onions, nutmeg, salt, pepper, vinegar.

Exercise 3.—Supply each member of the class with a different "green" if possible.

The preliminary preparation should be similar to that for the raw salad plants. Even if all is to be cooked it is desirable to sort out the tougher parts and give them a "blanching" or parboiling before combining with the tenderer portions.

Let each vegetable cook in sufficient boiling, salted water to prevent any danger of burning. The dish should be uncovered except when the vegetable is to be cooked in its own juices, in which case the dish must be covered.

Adopt a small standard portion suitable for one serving per person—2 ounces or one-fourth cup is a fair average—estimate cost, including original cost, labor, and cost of additions. Compare with cost of canned vegetables.

Observe the constant tendency to add to such plants the protein, fat, etc., which they lack by combining with them milk, butter, eggs, and salad dressings.

When few fresh greens are available, use canned asparagus. Remove from can, taste of liquid, and reserve it if the flavor is good. The stalks may be reheated and served on toast. Or tips may be served for salad with French dressing, and the stalks used for cream of asparagus soup. To make the latter, split open stalks, add liquid from can if suitable, heat, rub through coarse strainer, add milk, thicken, and flavor.

In each case work out the cost of material in city and in country, and add the labor of preparation. Note the advantage in the country in the use of such by-products or weeds as thinned-out beet greens or purslane.

Irish moss blanc mange may fitly form a part of this lesson. The whole moss is preferable to the sea-moss farina.

Stewed pieplant or rhubarb will also illustrate use of leafstalks as food.

This lesson may be carried out in the preparation of a luncheon or simple dinner with either of these menus:[1]

No. 1.	No. 2.
Cream of asparagus soup.	Cream of celery soup.
Spinach and eggs.	Asparagus on toast.
Creamed cabbage with cheese.	Kolcannon (potato and cabbage).
Stewed rhubarb.	Blanc mange.

REVIEW QUESTIONS, LESSON III.

1. Explain the terms "greens," "potherbs."

2. How should you divide plants that part may be used for salads, part as greens, or in other ways?

[1] Recipes may be found in standard cookbooks.

3. Give general directions for choosing, cleaning, and cooking dandelion greens.

4. Give a list of wild plants in your vicinity suitable for this purpose. How many have you tried?

5. Explain the shrinkage common with such foods.

6. Why is fat meat often cooked with plants of this type?

7. Give general directions for cooking cabbage or cauliflower.

8. How many asparagus beds in your neighborhood? Can you give method of preparing canned asparagus?

9. What reasons for use of white sauce with cooked cabbage, celery, etc.?

10. Give directions for making white sauce.

LESSON IV. BULBS.

THE ONION TRIBE.

Next to leaves and stalks, bulbs may be studied; they may be considered as a form half way between stems and roots.

A bulb is a kind of bud, spheroidal in shape, and from the botanist's standpoint consists of a cluster of leaves, modified in form and tightly folded together, one over the other. Usually they form above or just below the top of the ground. In some cases the young bulblets appear in the axils of the leaves (tiger lily) or at the blossom, as in top onions. Bulbs are characteristic of the lily family, which includes some of the most ornamental plants of the flower garden—hyacinths, lilies, narcissus, and tulips, for example. The American Indians used certain wild bulbs, including wild onions, as food, and those of some garden lilies are eaten in Japan and China and are also sold in Chinese shops in American cities. From the culinary viewpoint, however, the most important of the bulbous plants are the onion and some of its relatives.

The derivation of the word "onion" is significant, indicating the oneness of the bulb or the close union of the leaves and stems underground. The onion appears to have been a native of Asia and to have been used by the human race from the most ancient times and is mentioned in the Bible and in old Egyptian writings.

Onions owe their flavor to a volatile, oil-like compound containing sulphur, which has been carefully studied by chemists. It is a matter of common experience that onions act as a laxative. To this and the sulphur-yielding material they contain are no doubt due the medicinal properties commonly assigned to them. They are very succulent, but nevertheless supply some nutritive material, chiefly carbohydrates and sulphur and other mineral matter.

There is a large number of varieties of onions and each is useful in its place. Many kinds are grown by American farmers and gardeners, and the native crop supplies the bulk of the onions found in the markets. The tiny pearl and button onions are convenient for salads or pickles where only a hint of flavor is wanted. From the

Bermudas and the South in the early spring come flat, crisp onions of a purplish tint which are appetizing either raw or cooked, and more agreeable in texture than the coarser varieties commonly raised for the winter market. The large Spanish onions are mild and tender, suitable for salad or cooking purposes. The white-skinned Egyptian onions are usually a satisfactory variety. Most of these types are now grown in this country. There are many onions in the market which are strong in flavor and tough, which are not suitable for cooking though they may be used for flavoring purposes if better kinds are not available. In general, the greenish yellow and red types of onion, owing to their texture and flavor, are less satisfactory for cooking as a vegetable than those of lighter hue.

Garlic is of interest in the study of bulbs, even to those who may not like its strong flavor. Each bulbous root or stalk is a compound made up of several smaller bulblets, each of which is known as a clove of garlic, clove signifying the cleavage or splitting of the larger group. This plant, like other members of the onion race, has been used in cookery from the earliest times. Its use is now especially common among the Latin races in southern Europe, where the climate is said to produce a more delicate flavor in the bulbs. Carefully used in small quantities garlic is a desirable seasoning. Merely rubbing the side of the salad bowl with the cut surface of a clove of garlic gives sufficient flavor to the salad. A little garlic very finely chopped and sprinkled on the top of meat before roasting gives a flavor which many consider extremely good.

The leek is another useful plant of the same race; the bulbous portion is much elongated and the leaves are long and flat and sheathed over each other. In cultivation several inches of the lower end of the leafy part of the leek are blanched like celery. Its use as a potherb has already been noted. (See Lesson III.)

To cook leeks remove the fine roots and the green ends of the leaves and cut the white portion in 3-inch lengths. Wash and cook in boiling water until tender; that is, for 20 minutes or more. Serve on buttered toast like asparagus or with white sauce. If the leeks are too thick, they may be split and flattened after cooking. The water in which leeks are cooked may be used in soups. Closely related species called wild leek or wild garlic grow in some parts of this country and are likely to flavor the milk and butter of cows that eat them in the pasture. Wild leek is sometimes used as a seasoning.

The shallot is a cultivated plant similar to the leek, but with a tubular leaf. Chive is another member of the family, the leaves of which have a delicate, appetizing flavor frequently relished by those who object to the stronger onion flavors. Chives are sometimes used as a border plant in flower gardens, having an attractive purplish blue blossom. A clump of these tiny bulbs will grow for weeks in

the house; if they are planted in a dish of mixed ferns the peculiar shade of green in their leaves will make an attractive combination with the other plants, and the fine stalks may be cut as needed to flavor salads and soups. The essential oil is so abundant that a very small quantity of the leaf suffices.

Ordinary young onions are often sold under the name of "scullion" or "scallion," which properly belongs to any thick-necked or undeveloped bulb of the onion tribe which has not grown round, but more nearly resembles the leek in shape. In onion beds these are pulled out and marketed when young, or they may be grown from the bulbs of the previous year.

Onion tops, like the stalks of wild leeks and chives, can also be used for flavoring, especially the sprouts that start when the bulbs have been kept in a warm room. The young spring onions are sometimes eaten like radishes as a relish, or cooked and served like asparagus, and are a favorite dish. (See Lesson III.)

EXERCISES, LESSON IV.

Materials needed.—Butter or drippings, salt and pepper, milk, egg; one or two onions for each student, different varieties preferred; specimens of leek, etc., if possible.

PREPARATION OF ONIONS.

To prepare onions, peel under water, so that the volatile bodies which affect the eyes may remain in the water and be kept from scattering. If the onions are especially strong, after peeling place them in boiling water, to each quart of which one-fourth teaspoon of bicarbonate of soda has been added. After letting them stand in this water half an hour, drain and boil in plenty of salted water for 30 minutes to 2 hours, according to the toughness, changing the water if desirable. The water may be saved to flavor soups.

Often it is wise to take off one or two of the coarser layers next the outside skin and reserve them for flavoring soups, while a part of the tender, succulent center may be reserved for a salad. This plan of selection corresponds to that already suggested for cabbage, celery, lettuce, etc.

METHODS OF COOKING.

Any strong variety of onion is much improved for the table, in spite of loss of nutritive value, if the water is changed several times during the cooking process. Milk may be used for the final cooking.

If onions are cooked uncovered, the odor apparent in the house is less strong, and like cabbage and beans, they are commonly said to be more digestible when thus cooked.

There is a culinary tradition that parsley eaten with onions not only sweetens the breath but counteracts a tendency toward flatulence.

SECURING ONION FLAVOR.

The simplest way to extract onion flavor for seasoning salads, etc., is to cut a slice from the root end of the bulb and press the cut surface firmly against a grater, turning gently until some drops of juice fall. Cut off another slice

and press the fresh surface if more flavor is required. Sometimes with a fresh onion the grater is unnecessary, as sufficient juice will follow gashes made with a knife. When the onion is old there is little juice; the soft pulp which passes through the holes of the grater may be used instead.

Another way to secure onion flavor is to cook the chopped bulb in water, milk, or soup stock. Slices from which some of the juice has been extracted will again yield flavor if cooked in this way.

A third method is to extract the juice in fat; and for this purpose sliced onion is cooked in the fat until light golden brown, or sometimes until very brown, thus securing a combination of caramel from the browned sugar and the peculiar flavoring bodies of the onion, a flavor quite different from those obtained by the other methods. The scraps of onion may be strained out and the flavored fat added to sauce or soup, or they may all be used together.

Force meat or stuffing may be flavored with onion in any one of these ways, or chopped onion may be blanched or scalded in soda water and then added directly to the forcemeat.

A little chopped or finely cut onion may be prepared without soiling the fingers by holding the onion on a fork, cutting off the outer skin, making a few gashes in one end, and then slicing across the gashes.

Let each student boil two varieties of onions or an onion and a leek and note the time required and other points of difference between them. Save the water, note color, compare flavor.

Further exercises follow.

SPANISH ONION.

Cut an onion in two, reserve small portions of center for salad; parboil remainder 10 minutes; save water. Cut onion small, put in saucepan with a tablespoon of butter or dripping, a little salt and pepper, cover and cook slowly until tender.

Another method for preparing is as follows: Cut, reserve center, cook in water until tender, drain, and add milk or white sauce.

Make a cream soup from Spanish onion: Cook as before in a little water, when soft rub onion with water through strainer, add milk, thicken slightly, and season. Try with further addition of (a) egg, (b) cheese.

ONION AND APPLE SALAD.

Slice centers of Spanish onion very thin. Pile up slices and cut across to divide still finer. Combine with twice as much sliced apple. Leave red skins on apple as garnish. Add French dressing and chopped parsley or sweet pepper. Mayonnaise or cooked dressing may also be used.

ONION SOUP WITHOUT MEAT.

This favorite French soup is easily and quickly made and very palatable. Peel a good-sized onion, cut into small pieces, and cook slowly and carefully until tender in a heaping tablespoonful of fat or of butter. Then move the saucepan to a hotter part of the stove and cook the onion until well browned, stirring all the time to prevent burning. Add a pint and a half of boiling water, or milk and water, half and half. Season with salt and pepper, bring to a boil, and serve poured over a piece of toasted bread, or serve small cubes of bread fried in butter. If no milk is used it is a common custom to serve some grated, mild-flavored cheese, such as Swiss cheese, with the soup. A garnish of fried onion is often added to this soup.

FRIED ONIONS.

Fried onions may be prepared in either of two ways: (1) Sauté (that is, fry in a small amount of fat, not enough to cover) sliced onion in olive oil, butter, or other fat until golden brown and tender; or (2) fry a few pieces at a time in deep fat, let them remain in the hot fat until they are crisp, like Saratoga potatoes, but do not let them become too brown. If after the onions are sliced all the rings are separated, they fry more quickly and make a more attractive dish. Use to garnish meats or to add to soups, or combine with potatoes, stewed beans, or other vegetables.

STUFFED ONIONS.

Parboil large onions, remove centers without breaking the outer layers, and stuff with seasoned crumbs or meat, and bake until tender.

ONION CUSTARD.

Cook onions until tender; drain thoroughly. Pour over them a custard mixture made of one egg, one-half cup milk, salt and pepper to taste, for each half pint of onions. Bake gently and serve as a vegetable. In southern Europe this dish is popular, cooked with a crust, like small custard pies.

ONION SOUFFLÉ.

Chop cooked onion fine or rub through a coarse strainer. Combine with equal quantity of soft bread crumbs or half as many dry ones. Season with butter, salt, and pepper. For each half pint of the mixture beat in one egg yolk and fold in one stiffly beaten white. Put in small dishes or in onion cases (see stuffed onions) and bake gently until firm.

REVIEW QUESTIONS, LESSON IV.

1. Describe a bulb. Give examples.
2. Tell something of the history of the onion.
3. Mention and tell characteristics of other members of the same family of plants.
4. Give general directions for their preparation for the table.
5. When the flavor is objectionable, how may it be reduced?
6. What portion of an onion would be most acceptable in a salad?
7. Describe several ways of extracting flavor from the onion for soups, salads, etc.
8. Suggest some method of warming over boiled onions left from one day's dinner, so that they may appear in different form.
9. Is the onion a desirable food?
10. Tell how to make an onion soup.

LESSON V. TUBERS AND ROOTS.

During the growing season many plants store material for future growth in enlarged roots or underground stems either in solution in the very abundant plant juice (as sugar in beet juice) or in insoluble form (as starch in a potato tuber). The tubers and roots which are characterized by starch may be roughly grouped as starch-bearing ones; those which are characterized by reserve material in solution,

on account of their more or less juicy character, as succulent roots. Such distinctions, though inaccurate, will aid in understanding the nature and food value of the tubers and roots referred to in the following lesson.

WHITE OR IRISH POTATOES.

The potato is the most important vegetable of the group in the United States. Two distinct vegetables are commonly used in the United States under the name potato, i. e., the white or Irish potato and the sweet potato or yam of the Southern States. The prominence of the white potato in the daily diet of most Americans justifies special attention to it in these lessons. Though a native of America, it became so generally adopted in Ireland that it is now often termed the Irish potato.

One reason why the potato has become such a favorite vegetable is doubtless its lack of pronounced flavor. It harmonizes with foods having a more positive taste, and one does not tire of it as one would of the continuous use of turnip or squash. It is easily grown, gives an abundant yield, and may be stored for winter use. Mankind almost universally uses starchy food, and potatoes abundantly supply this in palatable form.

Potatoes should weigh 60 pounds to the bushel, or 15 pounds to the peck. As three or four average potatoes will together weigh 1 pound, a peck should number from 45 to 60.

The oftener potatoes are handled in their transit from producer to consumer the poorer their quality and the greater the percentage of refuse. When received from the market it is desirable to sort them carefully, that those of the same size may be cooked together—smooth, medium ones to be baked, large ones to be steamed in their skins, and imperfect and inferior ones to be pared before boiling. Any dark-colored or green portions should be removed, as they may impart a bad flavor to the rest. Sprouts should be broken from potatoes before cooking.

Langworthy (ref. No. 2)[1] states that cases of poisoning from potatoes are not unknown, which were attributed to the use of sprouted or very old potatoes or those which have turned green on exposure to the light. The poisoning which has been noted not infrequently after eating potato dishes of different sorts is now generally conceded to be due, like much other similar illness, to the accidental presence of bacteria of specific sorts and shows contamination with filth, even if the amount is too small to be recognized by ordinary means.

[1] The references in the text relate to the reference library specified in the Appendix which is to be supplied by the extension departments of the agricultural colleges.

Old and wrinkled potatoes are much improved by cutting off the ends or by partially or wholly paring and soaking in cold water for several hours. In fact, inferior potatoes of any age are much improved by paring and soaking. Where potatoes are inexpensive or the parings can be fed to animals, it is often a profitable custom to pare before cooking, since thus imperfections and strong-flavored portions are disposed of, leaving a nearly pure starch, comparable to arrowroot or tapioca and ready for the table as soon as cooked; this is true notwithstanding that careful investigations have proved that such cooking causes considerable loss of the nutrients in the potato.

The way in which foods are cooked has some effect on their food value. In the case of potatoes it has been found that when boiled with the skins removed there is a very considerable loss not only of organic nutrients but also of mineral salts. (Fig. 3.) When boiled with the skins on, the loss of nutrients is very slight. In the case of potatoes baked in the jackets, little if any nutritive material is lost. It is self-evident that, if it is desired to cook potatoes with as little loss as possible, they should be either boiled or baked with the skins on. When potatoes are the only vegetable obtainable it may be especially important to cook them without paring, so that their mineral salts may be retained, but people who use plants and other vegetables freely may be justified in considering chiefly convenience and palatability in the preparation of these tubers.

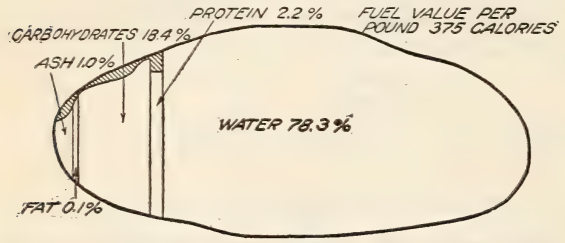

FIG. 3.—Composition of the potato. The shaded portion represents the average loss of nutrients when boiled with the skin on.

Often it is a convenience for the housekeeper who has several dishes to prepare at once just before dinner to have the potatoes pared earlier in the day. If so, they should be put in water with a little salt added, so that they will not turn dark.

Most good cooks believe that it is wiser to discard the water in which potatoes are boiled, as it is likely to be strong in flavor, rather than to save it for soup making or for some similar use as is recommended for the water in which celery, etc., is cooked. (See Lesson II.)

Potato flour may be found in large groceries and is used in cakes and for thickening purposes.

SWEET POTATOES.

Sweet potatoes are not strictly tubers, but tuberous roots. There are many varieties, with different shape and color. Northern mar-

kets prefer a dry, smooth, yellow type, while in the South the moist varieties showing more sugar when baked are the favorites. They may be kept in a dry place at a temperature of 50° to 65° F., and are sometimes canned and often dried like fruits for family use. A flour is also made from the sweet potato.

Because their sweetness is to some extent lost in water they are better steamed than boiled, and baking is the favorite method.

After cooking they may be pressed through a sieve and used in puddings or pies like squash or added to breads. (See Lesson VII.)

In southern homes it has always been customary to cook sliced sweet potato (often first parboiled) with sugar, butter, and other seasoning. Such dishes, under a variety of names, are now general favorites.

When the tubers are baked the process should not be too rapid, but should continue for an hour, until the skin separates from the pulp, and in the case of the varieties moist when cooked, until the sirup condenses and the pulp grows moist. The negroes in the Southern States bake them in the ashes in the fireplace and as soon as one meal is over put in those needed for the next.

JERUSALEM ARTICHOKE, YAM, CASSAVA, AND OTHER STARCH-BEARING TUBERS AND ROOTS.

The Jerusalem artichoke is a kind of sunflower which has a thickened rootstalk valuable for food. The carbohydrate material in the tuber is like gum rather than starch, which gives a peculiar texture after cooking. The tubers were more popular before potatoes came into general use. They are crisp in the spring before they begin to grow and may be cooked like creamed potatoes, served raw as a salad like radishes, or pickled. They are common in many rural regions, are found in city markets, and are not expensive.

Yam is a name carelessly applied to some types of sweet potato. The true yams belong to another variety of plants and include many species abundant in the Tropics, some of which may also be grown in temperate regions. Many are grown in the West Indies and Florida. They are rich in starch, though lacking the sugar of sweet potatoes, and the flavor is pleasant when they are boiled or cooked in other ways.

Many of these tubers are most satisfactory when baked, but, like the potato, they may be prepared in other ways.

A new tuber which has attracted much attention is the dasheen from tropical countries. The dasheens may be served like potatoes, boiled, fried, creamed, etc., but to many are, like potatoes, most acceptable when baked. They have a rough outer coating, which may be partially removed before cooking. If entirely pared there is a tendency to discolor, as with potatoes.

Cassava, or manihot, a semitropical plant used for food in the West Indies, Central and South America, is now cultivated in Florida. The roots are rich in starch. There are two principal types of the plant, the bitter and the sweet. The first is commonly grown in the Tropics and requires a longer season than the other, but produces a greater yield. The bitter cassava grown in Brazil contains more of the volatile poison found in this family of plants, but this is dissipated by heat and the washing of the grated roots. The sweet manihot is cultivated in some of the Southern States, but mainly for starch to be used for finishing in textiles and in other industries. From both varieties tapioca of various forms is made, as is also the cassava bread which is so common in tropical countries, and which is found in many city shops under the name of cassava cakes.

Arrowroot is the fine starch obtained from various tropical roots, and owes its name to the fact that the pounded roots were applied to swellings for poisoned arrows. The best arrowroot comes from Bermuda and the West Indies. In Europe it is popularly supposed to be the most digestible form of starch, and is much used for infants and invalids, as well as in fine puddings and similar dishes. In the United States cornstarch, the "corn flour" of English cooks, is more generally used.

Sago may be properly studied in connection with tapioca, arrowroot, and similar starches, as its use is very similar, but it is the product, not of a root or tuber, but the pith of a palm tree. The trees are cut and split; then the starch is washed, dried, and granulated. Fifteen years are required to grow a palm yielding 500 pounds of sago. The tree must be cut before blossoming. If time permitted, it would be interesting to study other palms which yield food products, especially the "cabbage palm" and those producing coconuts.

The principal food substance derived from all these underground stems is the starch which has been thus stored up for the next generation of the plant's life. Starches from different plants or plant parts differ in the form of the starch grain and can be identified by the aid of the microscope, but from the culinary standpoint they are practically interchangeable, and one form of starch may be substituted for another in nearly every case. The yam or a dish of rice may be substituted for the potato as a vegetable, or starch from the potato, or corn, or wheat, or rice may be used for thickening gravies or making puddings, slight changes being made in proportions, according to the expansive powers of each kind.

Starch cookery is a very important subject. That starch may be cooked it is essential that every starch grain be brought into contact with water of at least 140° to 178° F. A careful study of starch

cookery shows that potato, arrowroot, and probably tapioca and sago starch pastes are not made more easily digestible by long-continued cooking. However, in the case of starch still inclosed in cellulose cells, as in many starchy foods, the long-continued cooking may be necessary. (Fig. 4.)

The selection of potato starch instead of corn or wheat starch for thickening sauces in accordance with the custom of French cooks is rational, since it does not require such long boiling for improvement in flavor as is the case with cornstarch.

EXERCISES, LESSON V.

Materials needed.—A potato for each student; any other tubers available; rice, tapioca, cornstarch, rice flour, fruit juice or jelly, milk, butter, salad dressing; fancy cutters, slicer, and scoops; different styles of potato mashers and ricers. The latter are for trial; a fork may be used to mash a small quantity.

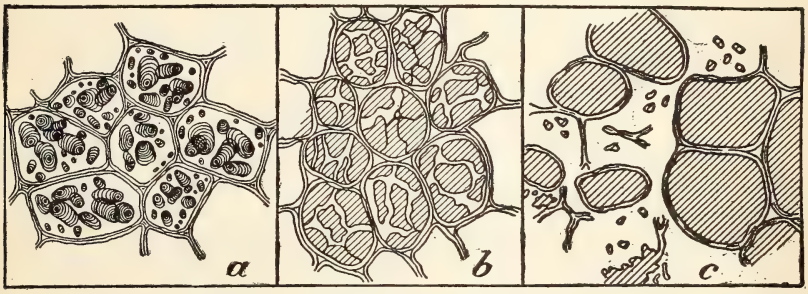

FIG. 4.—Changes of starch cells in cooking: *a*, cells of a raw potato with starch grains in natural condition; *b*, cells of a partially cooked potato; *c*, cells of a thoroughly boiled potato.

Exercises.—Let each student prepare a potato, each in slightly different fashion according to the directions given below; weigh before and after cooking, weigh refuse, estimate percentage of loss and the time and fuel required for cooking one potato. Are these factors proportionately increased for a larger quantity? Compare time required to pare potatoes before cooking and after. What advantages for either method?

POTATOES.

While the potatoes are cooking grate one raw potato, press out the water through a cloth or wire strainer into a glass measuring cup. Estimate percentage of water in the potato, then wash out the starch in the strainer, add to that settled from the juice, and cook it. Observe the nature of the material remaining in the strainer.

Among the methods of cooking potatoes which may be tried in this lesson are these:

Baked (1): Serve one at the right moment, leave another until the moisture condenses and the potato becomes soggy, with unpleasant odor and flavor.

Baked (2): Cut in two lengthwise, remove contents, mash, season, and return to skin. Add beaten egg white to one half, bake and notice difference. How is this difference caused?

Baked (3): Bake in dish, skin having been removed first; glaze occasionally with butter or meat fat.

Boiled: Cook one in skin, another without skin.

Steamed: Cook one in skin, another without skin.

Mashed: Boil one potato, mash, season with butter, salt, etc., add hot milk, measured, and note how much the potato will absorb.

Cut and boiled: Cut a potato in slices or cubes, add milk and seasoning as in previous recipe, and compare results. Add grated cheese to part.

Soup: Make soup from mashed potato in same fashion as with onion in previous lesson. Note lack of flavor—some addition of onion or celery indicated. Also note slight thickening needed in potato soup compared with onion soup.

Salad: Make salad with cooked potato and onion like apple and onion salad in Lesson IV.

Look up composition of potato. Does this suggest what other materials should be added?

For other dishes in which potatoes are an important ingredient, refer to standard cookbooks.

Comparison of rice and potato: Weigh out one-half pound rice, wash and cook in 2 quarts of rapidly boiling salted water until tender, and drain. The water may be reserved for soup in next lesson. Cook an equal money value of potatoes. Compare value of results, including cost of fuel and labor expended and considering refuse in potatoes, etc.

EXPERIMENTS WITH STARCHY MATERIALS.

Let each student or each two take a different form of starchy substance, tapioca (flaked, pearl, or granulated), cornstarch, rice flour, sago, starch from potato, etc.; cook with water until fairly transparent, salt slightly, and taste of each to learn to recognize characteristic flavor. Take equal amounts of each of them, add to each the same amount of fruit juice and sugar, and taste again to see how the flavor of the fruit affects or disguises the characteristics of each kind of starch. Note possibility of substitutions in recipes. Samples of these starches may be treated with dilute iodin before and after cooking. Dilute iodin turns starch a blue color. (See Lesson I, p. 8.)

REVIEW QUESTIONS, LESSON V.

1. Show differences between bulbs and roots; roots and tubers.
2. What are the principal food substances derived from roots?
3. Where did the potato originate and when was it introduced into Europe?
4. What differences in the nature of the new and old potato? How do these influence methods of cooking each?
5. What is the weight of an average potato?
6. How many pounds of potatoes are probably consumed in your household in a week or month?
7. How may you find that the potato contains starch?
8. How should potatoes as ordinarily purchased be selected for baking, steaming, croquettes, etc.?
9. Describe general preparation and use of the sweet potato.
10. What other roots and tubers furnish valuable starch?

LESSON VI. SUCCULENT ROOTS.

In the majority of these root vegetables the main or taproot has become thick and fleshy. If cross sections of such roots are carefully examined, with or without a microscope, it will aid one to

understand the effect of heat and moisture upon such foods. In older vegetables of this type large amounts of woody fibers or cellulose will be found, which does not soften readily when cooked.

Plants of this class have long been cultivated by mankind and are used in great quantities, though less dependence is placed on them in winter than was the case before improved transportation made a greater variety possible.

BEETS.

The beet gives a good illustration of the difference between the young and old plant. When young, the whole plant, leaves, leafstalk, and root, may be cooked for greens (see Lesson III), but by the time the beet is as large as an egg, the leafstalk is too fibrous to use and the leaves are becoming tough; later only the root can be used. The bunches of beets from warmer climates found in northern markets in the spring usually have leaves that may be cooked and served for greens with the sliced roots, and heat and moisture (cooking) will make them tender in half an hour. Large winter beets which have been out of the ground for months have lost moisture and become woody and may require four hours or more to make them eatable. Pickling in vinegar must often be resorted to before such beets are really tender.

Beets contain a larger proportion of sugar than most vegetables, and to retain as much of this as possible, should be baked or steamed. At all events, they should be cooked in the skins, and the tip of the root and a portion of the leaf stems should be left on until after cooking. Even so, some color and sweetness are lost in the water in which they are cooked. Canned beets are generally preferable to fresh ones when the latter are large or withered.

TURNIPS.

Many varieties of turnips are cultivated, but those used for human food fall into two main classes, mainly white-fleshed sorts and those with yellowish color and called rutabagas or "Swedish" turnips. The first are used more commonly in summer and the yellow in winter since they keep better. The pungent flavor of turnips, like that of cabbage and radish of the same group of plants, is due to sulphur compounds. Turnips may be boiled whole and mashed, or be cut into cubes before cooking. In the latter way they lose more of their flavor.

KOHL-RABI.

The kohl-rabi, which belongs to the same family as the turnip and the cabbage and combines characteristics of both, has been described on page 17. This is cooked and served like turnip.

RADISHES.

Radishes, red or white, when a little too old to be eaten raw may be cooked like turnips and served with a white sauce.

CARROTS.

The plant family (parsley family, or Umbelliferæ) to which the carrot belongs furnishes many of the root vegetables. A characteristic is the much divided leaf, so noticeable in the carrot, celery, parsley, chervil (one of the less-known seasoning herbs), and parsnip.

The carrot may have been a native of England, or, if not, was known there at an early period. It is believed that originally the root was hard and fibrous and that the fleshy outside has been developed by cultivation. As with other vegetables, there are many varieties, some so coarse in texture that those who know no other type might consider the carrot unfit for table use. Small or young carrots properly prepared are deservedly popular. Raw carrots are often eaten by children, and are advocated by those who believe in the use of raw foods. When grated or put through a food chopper, raw carrots may be used in soups without further cooking, or added to salads. The carrot contains so much sugar that its use for sugar making, in the same way as the beet, has been seriously considered.

PARSNIPS.

The parsnip is said to have been cultivated even before the Christian era. The roots can be left in the ground until the frost comes, or even through the winter, for freezing does not injure them, but seems to soften the woody fiber. Like other such roots, they keep well stored in sand in a cool place. In any case the roots must be used before they begin to grow again or they lose their sweetness and get "rusty." Large parsnips are likely to be woody and not very sweet. Small parsnips just from the ground in the spring will cook in less than a half hour. If steamed without paring, they lose less sweetness than when boiled. They should be peeled after cooking, and served plain with butter or with white sauce, sautéd in butter, or mashed and made into fritters. They are also good made into a stew with potatoes, onions, and milk.

CELERIAC.

This is a variety of celery, edible rooted (see p. 12), which deserves to be better known. It is sometimes called German or "knob" celery or "turnip-rooted" celery, and resembles the turnip in shape and texture, and may be cooked in similar ways. If steamed, more flavor is retained than if boiled. If pared before cooking, the water should be saved to flavor soups, etc. Where time must be saved,

celeriac, like carrots, may be cut into cubes before cooking, which means still more loss of flavor. Celeriac can be served plain with butter. It is an excellent addition to soups and stews, or as a basis for a cream soup. It may be creamed like potatoes, or may be used like them for making salads.

SALSIFY.

This vegetable, sometimes called oyster plant on account of its flavor, is available during the late fall and winter. Like the parsnip, it may be left in the ground over winter and is then particularly good for early spring use. The resemblance in flavor to the oyster is especially noticeable when the boiled vegetable is sautéd in butter or made into fritters. The root turns dark quickly if the skin is removed before cooking, and so if pared should be dropped at once into vinegar and water to prevent discoloration. After boiling for about 30 minutes, the salsify may be served with butter or white sauce, or mashed and made into fritters. It is also used made into a soup with milk.

CONDIMENTAL ROOTS.

Ginger and horse-radish are other valuable roots, but are used not so much for food as for the flavor or relish they give to other things. Horse-radish gravy is very good to serve with boiled meat. It can be made by adding to some thickened broth as much grated horse-radish as is liked. (See Lessons X and XIV.)

EXERCISES, LESSON VI.

Materials needed.—Old and new root vegetables, such as beets, carrots, parsnips, celeriac, or salsify; graters, cheesecloth, test tubes, saucepans, measuring cup, tablespoon, teaspoon, and knife; cup of milk, butter, flour, salt, and pepper.

Exercises.—Grate portions of each root available and note the proportion of water and the nature of the woody fiber. Compare results with those from the potato in the previous lesson. How about the proportion of starch? Taste the extracted water. Evaporate it and taste again.

PARSNIP, SALSIFY, BEET, AND CELERIAC.

(1) Cook parsnips, separating outer layer beforehand, and notice which part cooks sooner.

(2) Pare some before cooking, and cook others in the skin in separate kettles. Taste the water from each. Which has lost most sugar, presumably?

(3) Steam some parsnips of same size as those that were boiled. Compare time required for each process. Prepare salsify in same way. Use each for fritters or to sauté.

(4) Cook beets whole, in skins, and in smaller sections, and note loss of juice and color.

(5) Try celeriac in the same ways.

(6) Combine potatoes with some of these vegetables. Is the dish palatable? If so, does it not suggest a good way to make a small amount of such vegetables "go farther"?

CARROTS, TURNIPS.

(1) Cook one large old carrot whole in the skin.
(2) Cook one large old carrot whole with skin scraped off.
(3) Cook one large old carrot in slices.
(4) Cook one large old carrot cut into cubes.

If necessary, these may all be boiled in one kettle, and thus variation in time of cooking shown; but the difference in loss of substance can be shown only by cooking each form by itself. Compare, if possible, with young carrots as to time of cooking, texture, and sweetness.

The carrots cooked as above may be served: (1) Plain with butter, (2) with cream or white sauce, (3) buttered and combined with half as many green peas, or (4) buttered and blended with a little chopped parsley or chives.

Prepare turnips in the same way.

For further experiments grated carrots may be made into marmalade with sugar and lemon juice or added to a suet pudding. Grated carrot or that which has been put through the meat chopper makes an effective garnish for salad and may be used without cooking. It may be added to soups with little more cooking than is needed to heat it through.

WHITE SAUCE FOR VEGETABLES.

If white sauce (see Lesson III, p. 18) has been studied in a previous lesson, it should be reviewed. If not, it should be taken up now. Let each student also make a sauce in the same way, using in place of half the milk the recipe calls for water in which carrot, celeriac, etc., were boiled.

REVIEW QUESTIONS, LESSON VI.

1. Describe the structure of roots.
2. Tell of the methods of growth and preparation for the table of five common root vegetables.
3. Define succulence.
4. What are the principal food substances obtained from roots?
5. Suggest combinations of vegetables of this type with others of a different nature.
6. To increase the food value of this class of plants, what additions are desirable?
7. Mention some of the most helpful utensils for the preparation of these vegetables.
8. What are the advantages and disadvantages of paring before and after cooking?
9. Are there any vegetables of this class with which you are not familiar or have not learned to eat?
10. What substances extracted from roots have commercial value?

LESSON VII. FLOWERS AND FRUITS.

FLOWERS AND PRODUCTS MADE FROM THEM.

Most flowers are too delicate in structure to be of much value as foods, yet some are cooked occasionally, for instance, dandelion or marsh marigold buds in "greens." Cloves furnish another example. They are buds of a tropical tree and are picked before expansion and dried.

The buds, like the seeds of nasturtium, are occasionally pickled. Orange flowers are well-known ingredients of cakes, creams, and confectionery, being added for the flavor which they impart. Saffron and marigold petals once were considered important adjuncts in cookery, chiefly for the yellow color they imparted, and are often mentioned in old recipes for soups, etc. In southern Europe squash blossoms and the tiny squash to which the blossom is attached are dipped in batter and fried, and elder flowers and acacia blossoms also are used for fritters. Cooked squash flowers may be folded in an omelet.

Sometimes rose petals, violets, and mint leaves are candied, but are used more for garnishing than for food purposes. Rose petals in the Orient are used for making a very sweet preserve. Many other blossoms serve as food, chiefly in the Tropics, but need not be mentioned further.

Flowers are attractive ornaments for the table, but are not in good taste as garnishes for food. The fashion of serving salads in roses, molding blossoms in jellies, or adding nasturtium flowers to salads can not be commended.

CAPERS.

Capers are unexpanded flower buds of a tropical plant preserved in vinegar. They are imported, but are fairly common in shops and are most often used in a gravy to give relish to boiled mutton or to garnish salads.

CAULIFLOWER.

As noted elsewhere (see p. 4), the portion of the cauliflower eaten is the flower head; the leaf and stalks are usually discarded, though these may be used as "greens." In some countries the leaves which inclose the flower head are cooked and eaten with it.

GLOBE ARTICHOKE.

The French or globe artichoke is, next to the cauliflower, the most important example of the use as food of the flower portion of a plant. It thrives in southern Europe and the southern and central United States, but is not hardy enough for cold climates. The base of the flower head (known as the "bottom" or "button") and the thick bare scales of the leaves which inclose it have a delicate flavor if used before the bud is fully opened. The simplest method of preparing artichokes is the best. Remove the stalk and under leaves and cut off tips of scales. The flower heads may be eaten raw when very young, but commonly are soaked and parboiled in salted water until tender even when used as a salad. When done the leaves will separate readily. The "choke" is the fibrous center which should be scraped

out with a spoon after cooking, but is not troublesome if left in the young heads. The individual "leaves" are pulled off and eaten with a sauce or dressing. The bottoms may be dipped in batter and fried in deep fat or covered with force meat and then baked like stuffed tomatoes. Artichokes are interesting garden plants worth knowing. The canned French artichokes are fairly common in shops which cater to Italian trade.

The cardoon is allied to the globe artichoke, but is little used in the United States.

HONEY.

Honey may be properly classed among the food products derived from flowers. In ancient times, before cane sugar was manufactured, it was the principal sweet, and to-day it is still much prized. A study of its history and folklore is interesting.

The varying qualities of honey derived from different flowers are worthy of note. That obtained from white clover fields is of fine flavor and light color; raspberry plantations furnish a good quality, while buckwheat gives a dark color and a flavor which some do not relish; and certain wild plants, such as mountain laurel, may impart poisonous qualities to the honey made from them. Recipes which have been handed down for generations are still used for honey cakes and cookies. Strained or extracted honey may be substituted for molasses or other sirups or for sugar in many common recipes. (Ref. No. 8.)

COLORS AND FLAVORING EXTRACTS.

Flowers find a considerable use in cookery for coloring and flavoring purposes. Dried saffron flowers, as already mentioned, are employed for coloring foods yellow. Violets are used in a similar way for imparting a purple color, while a number of other colors are made from blossoms or leaves. Some highly prized flavoring extracts are made from flowers; for instance, rose extract, orange-flower water, and sirup of violets. Nasturtium flowers are used, like tarragon, for flavoring vinegar, and other similar uses might be cited.

FRUITS USED AS VEGETABLES.

The fruit of a plant, botanically, is that portion in which the seed is perfected. In popular language, the distinction between a fruit and a vegetable is not easily made, and on the border line are several important food plants which have been called "vegetable fruits." Such are tomato, eggplant, peppers, and many members of the gourd family (melons, cucumbers, squash, pumpkin, vegetable marrow, etc.).

Some varieties of the gourd family were known in Egypt and Persia from the earliest times, and squashes or pumpkins, the "pom-

pions" mentioned by some of the early writers in this country, were raised by the American Indians before the white men came.

PUMPKIN AND SQUASH.

There is great variety in texture and flavor of individual specimens of the same kind of either squashes or pumpkins. The best for table use are heavy in proportion to their size, having thick rather than thin flesh. Careful cooking is a great help. If the fibers are coarse, long cooking and straining will reduce them, and excess of water may be evaporated. Where the shells are hard, bake or steam and then scrape out and mash the flesh.

The cooked, strained pulp of squash or pumpkin is sometimes combined with milk or stock for soups or with custard for pies, or is added to doughs like those of corn bread or muffins, or may be cooked with sugar and spices for marmalades.

The summer squash is not always fully appreciated because too often it is allowed to grow too large before it is used. Both crookneck and turban varieties, or "cymling," should be so tender that the seeds and skin are edible when cooked. Cut in pieces, put in a kettle of salted boiling water, and cook 20 to 30 minutes till tender. Drain in a fine wire strainer, pressing out all the water possible. Then put the squash carefully on the back of the stove or in the oven with the door open so that more water will evaporate; then season with butter, salt, and pepper. Summer squash are also much liked cut in slices and fried. When fully grown they may be used like winter squash, skin and seeds being removed.

CUCUMBERS AND MELONS.

These fruits have long been popular. Not only are they liked as food, but since they contain so much water (90 per cent or more) are commonly used for quenching thirst in some eastern countries where good water is not easily obtained. Stale, wilted, or overgrown cucumbers may interfere with digestion, but a fresh, young specimen, thoroughly peeled and left in cold water (sometimes salted) before serving, seldom causes distress, and is a very popular relish.

The cucumber may be served as a salad by itself or to accompany fish or meats, or may be grated to add to meat or fish sauces, and is a favorite material both green and ripe for pickles. It may be cut into strips, cooked, and served on toast like asparagus, and in other ways. The skin and seeds may be removed and the firm flesh used as a case for salads or, like pepper and tomato, it may be filled with force meat and baked. Though not commonly so used in American families, cooked cucumbers are palatable and well worth using for the variety they give.

Melons rank with fruits. The common varieties are almost never cooked but are eaten as they come from the garden. The use of melon rinds and melons in their unripe state will be considered under pickles. (See Lesson XIV.)

GREEN PEPPERS.

The fleshy seed vessels of many varieties of garden peppers are used not only for their condimental value, but particularly the "sweet" varieties are prepared for the table in many ways. Green peppers, which lack the "hot" taste of the garden varieties which were formerly the more common, may be found in the city markets most of the year at reasonable prices and are used increasingly either stuffed and baked or fried like onions as an accompaniment to meat or as an ingredient of omelets, soups, and salads.

The stem and seeds of the green pepper should be removed together by cutting around the stem, and the end and the "core" may be used for flavoring soups. The seeds themselves are likely to be hot and need not be used.

If the peppers are small and fresh, they may be chopped or sliced thin and used raw in salads or as a garnish. Often they are better for parboiling. If put into a hot oven or on top of the stove for a few moments, the outside skin may be easily removed.

Garden peppers have long been popular for use in making pickles and relishes of different sorts.

The canned sweet Spanish red peppers (pimientoes) may be used in similar fashion and may be obtained from any large grocery store at moderate prices. Sweet peppers, like other varieties, will grow well as a garden vegetable, and they are being grown and canned by the members of the girls' canning clubs in the Southern States. These peppers are valuable because they make tasteless foods savory and attractive. Paprika is prepared from peppers of this mild type (see Lesson X); red or cayenne pepper, from "sharp" or "hot" varieties, which are also much used for making pepper sauce.

OKRA.

This plant succeeds best in warm climates, though it may be grown as far north as New England. Fresh okra stands shipment well and the pods are common in localities where the plant is not raised. Dried and canned okra is obtainable in most markets. Young pods cooked in boiling salted water will become tender in 20 minutes. They are then drained, seasoned with butter, cream, salt, and pepper, and served like any vegetable.

The pods and seeds are used together and usually are sliced crosswise. It may be used alone seasoned with butter, salt, and pepper,

but is more often added to thin soups, as its mucilaginous nature serves as thickening, or with onions, carrots, etc., in making vegetable soups and in stews.

EGGPLANT.

This plant has long been known and succeeds well as a garden vegetable in many localities. It ships well and so is often found in market. It belongs to the same family as the potato and tomato—the nightshade family. As is the case with all succulent vegetables, its nutritive value is not high, but it is palatable and much liked by many, and should be better known than it is in some localities. It may be cut in two, stuffed and baked, or sliced, crumbed, and broiled or fried. To extract some of the moisture before frying, the sliced eggplant often is sprinkled with salt and a weight put on top of the pile of slices to press out the juice.

TOMATO.

The tomato is a native of America, but though known in Europe since the sixteenth century, was slow in coming into favor, no doubt because of supposed poisonous qualities. It did not become common as a vegetable in the United States until about the middle of the nineteenth century, though grown before that as an ornamental garden plant. It is now used very generally and has grown in popularity here and in Europe very rapidly.

To this vegetable fruit we owe much in cookery. Though its food value is not high it is very palatable and refreshing and very useful as a seasoning for a great variety of dishes. Alone and in combination it provides soups, sauces, and salads, and many relishes which make many mild-flavored materials appetizing. Tomatoes are preserved, made into pickles, and used in many similar ways, as well as raw and cooked as a vegetable. The tomato owes its flavor to special substances including citric acid.

Except in the case of special varieties with tender skin (and these should always be washed), tomatoes when served raw should always have the skin removed. This is easily done if the tomatoes are plunged into boiling water for less than a minute, then drained, and chilled. They may be peeled when needed. Perfectly ripe tomatoes may be scraped with the back of a knife to loosen the skin, which then will peel easily, but this is less rapid than the scalding process. If cooked, tomatoes are to be strained. It is unnecessary to peel tomatoes for stewing, as they can be strained before use and the skin will remain in the strainer with the seeds. The very small red tomatoes which grow in clusters, known as cherry tomatoes, are often found in large markets and are very attractive for salads, and the yellow plum tomatoes are perhaps always eaten without peeling, and hence should be carefully washed.

BANANAS.

The banana is very commonly used as a vegetable, especially when underripe. It may be baked or fried like the potato or yam and served with meats. A satisfactory and simple way to cook bananas is to remove the skin, scrape off the rough outside, cut large ones in two, dip in egg and crumbs, and fry brown in deep fat. Bananas are also used very commonly for making fritters to serve with meat.

EXERCISES, LESSON VII.

Materials needed.—Three cans of tomato or fresh tomatoes; onion, squash, green pepper, any other vegetable fruits in season; can opener or sardine scissors, strainer, masher, bread crumbs, butter, flour, seasoning.

Exercises.—The water in these fleshy seed receptacles may be shown by slicing and sprinkling with salt and leaving over night. Then drain, weigh, and compare the result with original weight. Have canned tomato of two grades with marked difference in price. Weigh each can; weigh contents again after emptying.

Cook each grade separately 15 minutes and strain through medium wire strainer, weigh refuse from each lot, and compare results. Estimate relative values based on cost, quality, and quantity.

Open another can of tomato and drain in strainer without pressing through. Reserve liquid for soup, use solid portion for escalloped tomatoes.

Use the strained tomatoes in any of the following ways:

(1) Tomato toast.

(2) Tomato jelly salad.

(3) Tomato soup. Several types of tomato soup may be made: (*a*) One part tomato, one part water with flavor of herbs, and slight thickening with cornstarch; (*b*) one part tomato, two parts water, and a little beef extract; (*c*) one part tomato, two parts milk, and seasoning.

(4) Tomato sauce.

(5) Spanish sauce.

The following processes are also suitable for this lesson if the materials are obtainable:

Stuffed eggplant; summer squash sauté (fried); winter squash, hard shell, steamed or baked; pumpkin or squash pie; stewed cucumbers on toast; cucumber and tomato salad; eggs poached in tomato sauce; stuffed peppers or tomatoes.

REVIEW QUESTIONS, LESSON VII.

1. What have you to say regarding the association of flowers with food?
2. Have you ever seen flowers used in a way that seemed unsuitable?
3. Tell something of the source and preparation of capers and cloves.
4. What product from flowers does the human race obtain through insects?
5. Describe a fruit.
6. Mention five so-called vegetables that are strictly fruits.
7. Mention several members of the gourd family that have been used from ancient times.
8. Tell something about the tomato plant, its family and characteristics.
9. Give a list of dishes where the tomato is useful.
10. Mention any other flowers and fruits used chiefly for condimental purposes.

LESSON VIII. SEEDS.

Seeds contain the embryo from which the new plant develops and almost always a store of nutritive material for the growth of the plant for a time after the seed has sprouted. The stored material varies in different plants; thus in such nuts as the walnut oil is very abundant, while in the cereal grains it is chiefly starch. Seeds are usually protected by a hard outer covering like the bran layers and skin of wheat kernels or the shell of a nut. Frequently there is additional protection, as the husks on an ear of corn or the pod in which beans or peanuts grow.

Seeds constitute one of the most important food groups, as is evident when it is considered that numbered among them are the cereal grains, beans, peas, and other legumes, as well as nuts and the oil-bearing seeds such as cottonseed and sesame seed.

Many seeds besides those used as food stuffs are important; for instance, those prized for their aromatic flavors, such as allspice, cardamom, and caraway.

The cereal grains have been considered at length in an earlier bulletin of this series, and aromatic seeds will be discussed in the lesson which deals with spices. (See Lesson X.)

The pulse family, which includes a number of the most important vegetables, is chosen for the subject of this lesson. Its seeds are often called legumes; the unripe seeds and pods are very popular vegetables, while in their dried form they are an important group of food materials.

The bean, lentil, and pea have been recognized in all ages and in all lands as substitutes for both bread and meat, and for the human race come next to the grains in general use.

The flavor of this class of foods does not appeal at all, and sometimes they are found to be a cause of digestive disturbance.

So far as the natural flavor is concerned, it is often wise to remove a portion of it, even if this means also loss of substance, by soaking before cooking and by occasionally changing the water in which the dried beans are soaked and in which they are cooked. The taste might be modified more commonly than is the case by the use of added flavors. Mint, parsley, onion, etc., often are cooked with green peas and beans, and their use would seem more needed with the dry ones. Other herbs and sweet peppers or pimientoes, either green or red, and tomatoes may also be used to give variety. Much can be learned from the Mexicans in their use of beans in combination with meat.

BEANS, PEAS, COWPEAS, AND LENTILS.

Such beans as the navy bean, Lima bean, cowpea, peas, and lentils contain relatively little fat. They do not grow rancid like grain

products, but the older they are the harder it is to make them palatable and soft, and the longer the processes of soaking and cooking.

The long soaking of these dried seeds is an important factor in their cookery. It took a long time for the seeds to ripen and dry in the pod on the vine and they lose rather than gain water in the store and house. Therefore it is reasonable that considerable time should be required to fill out the cells of such a dense substance with water. Except when the weather is warm and there is danger of fermentation, beans, lentils, etc., may be profitably soaked for even 48 hours. Pick over, wash well, and add 1 quart of water for 1 cup of beans, and set in the refrigerator or other cold place. Soaking helps to remove any rank flavor.

After this complete filling of the tissues with water the time required for cooking will not be much longer than for shelled beans fresh from the garden. True, there has been some loss of substance, but a corresponding gain in palatability. If the soaking is not so thorough, the cooking must be continued longer. The use of bicarbonate of soda in the preparation of legumes is often decried, and it certainly should be employed with moderation, nevertheless it serves a useful purpose in making the skins more tender, and probably also forms new combinations with or neutralizes substances which tend to produce indigestion or flatulence.

Soft water is far better than hard for both soaking and cooking dried legumes. By "hard" water is meant water impregnated with various salts, as lime and magnesia salts which it may have gained from the rocks and soil over which it passed before it reached the place from which it was drawn or piped. These salts unite with the legumin (a form of protein) contained in the seeds to form insoluble compounds; and consequently portions of the vegetable remain hard, no matter how long they are cooked.

The question then arises, What is to be done when the only water obtainable for cooking is hard water? In most books on cookery it is advised to add to the water in which peas and beans are cooked a small quantity of baking soda, a teaspoonful to the gallon. If the hardness is due to calcium carbonate, the soda will remedy it for cooking purposes. Just why it is not easy to say. Peas and beans cooked in this water are indeed easily softened, but experiment shows that the flavor may be injured. If soda is added, it is better to boil the water before using. But since the cook has generally no means of knowing the degree of hardness of the water and thus the exact proportion of soda to be added, it is perhaps better simply to boil the water before using and pour it from the sediment. When the hardness is due to the presence of the sulphate of lime or magnesia, neither boiling nor the addition of soda will avail to make the water desirable for cooking legumes. It is often possible to use rain water

for both soaking and cooking legumes, and this naturally distilled water is the very best for the purpose.

Since the proper preparation of legumes is a long process, it is well to cook enough to serve in two or more fashions. Thus the baked beans are often reheated or served cold and the final remainder used in soup. So, too, the dry Limas or red kidney or any variety may first appear as plain buttered beans, a further portion, prepared at the same time, be reserved for salad or croquettes, and any still remaining be utilized in making a soup.

The addition of potato or onion to the pot of beans before baking is doubtless an instinctive attempt to supply flavor lacking in the bean.

Lentils are not as generally used in this country as they deserve to be. They may be found in the markets of foreign sections of large cities and in the larger groceries. The price is about the same as that of dry beans and peas. There are many colors, as with beans, and Esau's pottage is supposed to have been made from red lentils. Sometimes they are served like peas or with a seasoning of fried onion. Sometimes soup or purée is made from them.

Cowpeas are cooked much like navy beans. Dried peas are most commonly used for making soup or for purées or pea porridge.

The Mexican frijole is another type of bean the use of which might well be extended. It is boiled, often highly seasoned with Chile pepper, and cooked in other ways.

Chick-peas are used extensively in southern Europe and may be found in the foreign markets in the large cities of this country. These are cooked in different ways, much as navy beans are.

The people of the Far East have cultivated many varieties of legumes that are not so well known elsewhere as food for man, though much use is made of them in the United States, particularly as forage crops. The soy bean from China and Japan differs from other common varieties in containing considerable fat; it is used in making special types of so-called bean cheese or bean curd and for sauces of agreeable flavor. Ground into flour, soy beans can be used for making muffins and for similar purposes. The adsuki bean from the same countries is very prolific, and may be grown in this country. Its seeds are smaller even than the pea bean, but when prepared in the same fashion seem not unlike other legumes. These beans are often combined with rice by the Japanese.

Flour made from beans and peas may be used in making soups, but the results are not always as palatable as soups properly made from the seeds themselves.

BEANS AND OTHER LEGUMES USED GREEN.

The use of fresh young peas, beans, and cowpeas is very common, the seeds being sometimes served alone, and often with the succulent

pod containing them. The pods of peas are ordinarily discarded; but sometimes they are cooked for a while, and then the water in which they were boiled is used for cooking the peas themselves. There are also edible podded peas which are used in the same way as string beans.

"String" or "snap" beans, if young and tender, may be cooked quickly. Like all green vegetables, they should be cooked only until tender. Too long cooking spoils both color and flavor. If old and well grown, they need longer cooking. If overgrown, they will be improved by parboiling for a few minutes in water to which soda has been added, about one-fourth level teaspoon of soda for 2 quarts of water. They should then be drained and cooked in fresh water. A combination of string and shell beans is a pleasing change from either alone. String beans appear to be more wholesome if cooked uncovered.

The large, green pods of the red or cranberry beans remain tender until the seeds are nearly full grown, making them among the best snap beans. Canned fresh string beans and green peas are important commercial products, as are also canned baked beans and some similar goods.

In the Southern States cowpeas or field peas have been grown for many years as a food for animals and man and for green manuring. These have a distinctive, pleasant flavor; are used dry, green, and as "snap beans," and are cooked like other peas or beans.

PEANUTS.

Peanuts, though commonly classed with nuts, are in reality a legume and closely related to beans, peas, etc. After blossoming the stem bends over, and the seed pushes into the surface of the ground and ripens in the earth.

Peanuts assumed little commercial importance until after 1865. About this time their use became general all over the United States, where they are now used in great quantities for eating out of hand, in making many foods and confectionery, and for peanut butter, the demand for which increases.

Raw peanuts are sometimes eaten, and are relished by many if well ripened and cured. They are often said to be difficult of digestion, though this statement rests on belief rather than on experimental evidence. More commonly they are roasted. Some households find it wise to buy raw peanuts and roast them as needed. Overroasted peanuts are undesirable both as to flavor and digestibility.

Peanut butter may be made at home as wanted by putting the roasted and shelled nuts through the meat chopper. The name peanut butter is justified not only by its appearances and uses, but also

by the large amount of fat which the peanut contains, and which differentiates it from other legumes.

COTTON SEED.

Cottonseed meal is being experimented upon for human food. It has long been used for animals. The meal or flour remains after the oil has been extracted. Cottonseed oil is used in many ways like olive oil and similar oils, and in the manufacture of culinary fats.

WHEAT, OATS, AND RICE.

The seeds of the common cereals are often used in preparing dishes served as vegetables, such as boiled rice, macaroni dishes, oatmeal fritters, farina cake, etc.

Cereals do not possess very distinctive flavors, so it is a common practice when using cereal products in this way to season the dishes highly with cheese, with tomato, or with onion, or else to cook them in ways which will give flavor as, for instance, by browning in fat. Rice cooked with tomatoes, macaroni with cheese, and noodles seasoned with fried onions are familiar examples of well-seasoned cereal dishes made tasty by the use of seasoning, while rice croquettes, mock oysters (made of sweet corn), and farina fritters are examples of foods made savory by browning in deep fat.

CORN.

Corn is a native of the New World and has been cultivated for centuries before America was discovered. Originally a tropical plant, it had been developed and changed by selection and culture until it would mature a crop as far north as Montreal, a remarkable achievement for an uncivilized people like the Indians.

Corn is commonly regarded as a distinctively American foodstuff, but it was long ago introduced into other countries and is now extensively used in the Mediterranean regions of Europe, in Africa, in Australia, and in China. In the United States it is—as it has been since colonial times—a staple and very important foodstuff.

Corn is a very important breadstuff and is served in more forms as a vegetable than perhaps any other grain. The Mexicans use the corn husk to wrap the combination of corn, meat, and seasoning known as tamales. The hulled corn or lye hominy is used not only as a breakfast cereal but also as a vegetable, and so is the cracked corn or hominy.

But the sweet or green corn is most used and is one of the most highly esteemed of American fresh vegetables. Enormous quantities are eaten fresh, and its canning is a great industry. The ears are roasted or boiled and served on the cobs; or the raw or boiled corn is cut from the cob and stewed or fried alone or in combination with

beans, tomatoes, potatoes, etc., or served in soups or salads. Corn cut from the cob is sometimes used in making pickles or relishes. The very young cobs are also pickled. A full discussion of the food value of corn and corn products and of corn meal cookery will be found in earlier bulletins of the Department of Agriculture. (Ref. No. 3.)

BUCKWHEAT.

Another seed of importance is buckwheat, which in reality is not a wheat at all, but is a near relative of sorrel, dock, and bindweed. It has been used for centuries in many countries of the Old World where grains are cultivated. Buckwheat pancakes or griddle cakes are a characteristic American dish. A sort of biscuit or shortcake or shortbread is also made, though less commonly than in earlier times.

EXERCISES, LESSON VIII.

Materials needed.—Dry beans and peas of as many varieties as are obtainable, such as white pea, yellow eye, red kidney, black, Lima, green flageolet beans, whole, split yellow, split green peas, lentils, approximately one-half pound each; flour of beans, peas, and lentils; peanut butter; cans of green corn, peas, and of Lima or red kidney beans, or both; butter or other fat, milk, seasoning.

COMPARISON OF FRESH AND DRIED LEGUMES.

When possible secure green peas or beans in the pod, measure and weigh (1) as purchased, (2) after preparation for cooking, (3) after cooking, and estimate percentage of loss and actual cost per person. Keep a record of the time required to string the beans or shell the peas.

Compare all results regarding cost with those from canned peas and beans, using care in separating the liquid from the latter.

Taste the water in which fresh green peas are boiled and note its sweetness; allow it to evaporate until just enough remains to serve with the peas. Taste the water from canned peas; if agreeable in flavor, do not throw it away. Note the difference in the water from string beans.

LIMA BEANS.

Weigh and measure the dried beans, wash, soak, and leave 24 hours; weigh again; if feasible, leave 12 to 24 hours longer and again weigh, to see how much they swell after the first weighing; measure and compare with original bulk. Compare also with bulk of Lima beans. It is a good plan to count the number of beans in the can and compare with the cost of the same number of dry ones.

If Lima beans are not available, try the same experiment with any kind of beans available.

Dry Lima beans may be cooked until the skins are tender. The beans are so large that it does not take so long to slip off the skins by hand after parboiling as it would to rub the cooked beans through a colander, and most of the skin would go through also. The skinned beans may then be cooked and served much like mashed potato, with addition of fat, salt, and pepper, or may be used for croquettes or soup. Or some of the beans which retain their shape may be rinsed and served with lettuce and dressing for a salad.

In connection with this use of Lima beans it is interesting to note another use of legumes in salad dressing. Peanut butter reduced with lemon juice or water and vinegar and seasoned makes an excellent salad dressing. Cottonseed oil, peanut oil, and a number of other seed oils, when rightly made and refined and fresh, may be palatably used in salads in the same way as olive oil.

BAKED BEANS.

Baked beans are not easily managed in short experimental periods; but their study may be accomplished in lessons on successive days, or if this is not convenient, the leader or other member of the class should see that the beans are made ready for cooking or partly cooked the day before the lesson. Soak the beans 12 to 24 hours, then parboil, and then bake. If preferred, let them be well started in the baking process and then transfer to a fireless cooker, where they may remain till the next day. At the beginning of the next lesson put them in a hot oven and bake two or three hours more. By this plan a fairly good result will be obtained.

Recipe.—For 1 quart beans, soaked, parboiled in water with one-fourth teaspoon of soda and then drained and rinsed, use one-fourth to one-half pound of salt pork. Place the beans in a deep earthen bean pot and bury the pork in them. Mix one-half teaspoon dry mustard and one teaspoon salt, one-fourth cup molasses or brown sugar, with water to cover the beans. The bean pot must not be too full, and should be covered. As the water cooks away, add more. At the last bring the pork to the top and leave the bean pot uncovered to brown the surface. Beans should bake slowly 10 to 12 hours.

COWPEAS.

The cowpea, or field pea, as it is sometimes called, is commonly grown in the Southern States. Cowpeas may be used in place of other legumes in practice work, if more convenient, or may be used in addition to them.

The cowpea requires a longer season to mature than the kidney beans and so is seldom found in northern markets, though it might well be generally introduced on account of its distinctive and agreeable flavor. The tender cowpea pods can be cooked like string beans, the underripe peas shelled and cooked like green peas or green beans, while the dry peas may be used in various ways for making soups, croquettes, fritters, and other dishes.

Baked cowpeas may be prepared according to the directions given above for baked beans, or the dry cowpeas may be covered with lukewarm water and parboiled slowly for several hours until a little soft, at one lesson; and then at the next period transferred to the bean pot, seasoned with salt pork, and other seasoning if desired, and baked slowly for about six hours.

To accompany this lesson one of these menus might be prepared.[1]

1.	2.	3.
Green split-pea soup.	Peanut soup.	Cream of corn soup.
Baked beans.	Spanish beans.	Succotash, or
Apple and onion salad with peanut-butter dressing.	Green pea timbales.	Corn fritters, or
	String-bean salad.	Hominy croquettes.
	Peanut cookies.	Baked Indian pudding, or
		Cornstarch blanc mange.

[1] Recipes for these dishes may be found in many cookbooks; for instance, see reference numbers 10 and 11.

REVIEW QUESTIONS, LESSON VIII.

1. Describe seeds of different types.
2. Why do seeds contain more concentrated nutritive material than other parts of plants.
3. What groups of seeds are most important for human food?
4. Describe two principal types of leguminous plants.
5. What is the main difference in composition between dry beans and fresh shelled beans?
6. Explain the addition of fat meat in baking beans.
7. What uses have been found for cotton seeds?
8. What can you say of buckwheat, its characteristics, growth, and uses?
9. Mention points in favor of and against grinding peas, beans, etc., into a flour before using them for soups.
10. Compare canned and dry beans as to cost, labor of preparation, and quality.

LESSON IX. FUNGI.

There are many plants quite unlike those already referred to, in that they contain no green coloring matter and are flowerless. Mushrooms and puffballs are well-known members of this class of plants which is called by the Latin name *fungus*, and includes many curious specimens of varied sizes, forms, and colors.

A characteristic of this type of plant life is that it draws its subsistence not directly from the earth, but from other organic matter. There are thousands of species thriving either on the living tissues of their hosts or on the cast-off cellular matter of the latter. Some, like the molds, are very minute, while puffballs and toadstools are often very large.

Many of the larger kinds of fungi are popularly grouped together as mushrooms. Some of these are extremely poisonous; others are harmless, but of no particular culinary value, while there are many edible varieties much esteemed for their delicate and peculiar flavor.

Many of the edible mushrooms prove irritating to the digestive tract, if used when past their prime, and are then very commonly infested with insect life. None of the common tests of silver spoon, etc., for poisonous varieties are safeguards.

Mushrooms should be gathered without the adhering earth, the stems broken rather than pulled, for once sand is scattered through the gills it is hard to remove. First wash by floating in water, gills down. Young or button mushrooms need not be peeled, but old ones should have the skin removed, pulling it from the circumference to the center.

The common market mushroom (*Agaricus campestris*), which is often found growing in old pastures, is the only kind commercially cultivated in this country. It grows 2 to 3 inches high, has a cap about as wide when fully expanded, which is a brownish white above and sometimes tinged with pink below. The color deepens as the

mushroom grows older, but even when it is fully expanded and quite dark the flavor is good. It may be purchased canned, but is much better fresh, and may be grown for home use. Dried mushrooms of various kinds may be bought in some large markets and in the small stores in the foreign quarters of large cities, or may be dried at home.

Many recipes for cooking mushrooms call for the removal of the stems, but they may be used if not too woody. It is a good plan to slice them crosswise and cook for a few minutes previous to adding the caps, or the stems may be reserved for flavoring soups or sauces.

The food value of the mushroom, which is really much the same as that of common green vegetables, has often been rated higher than it deserves, partly because the analyses of fresh and dry have been confused.

MILDEW, MOLDS, AND FERMENTS.

These are also classed under fungi. Some of them are looked upon as enemies, yet many of the characteristic and delicious flavors in butter, cheese, fruit cakes, and pickles are due to the development of such fungi. (Ref. No. 59, pp. 51–57.)

H. W. Conn (ref. No. 13) says: "A few of our food products are, however, benefited by the development of molds. * * * The peculiar flavor of certain cheeses is due to the growth of molds, Roquefort, Stilton, etc."

YEAST.

Yeast is a microscopic plant of the fungus type. It will grow without light, but like any plant it must be kept moist and warm. It will grow in a wide range of temperatures from just above the freezing point to over 120° F. Though formerly commonly prepared at home, yeast for bread making and similar purposes is now very commonly purchased ready prepared.

EXERCISES, LESSON IX.

Materials needed.—The materials needed include mushrooms, fresh, dried, or canned, pieces of rotten or moldy apple or other fruit, and either yeast cake or liquid yeast.

MUSHROOMS.

Prepare fresh, dried, or canned mushrooms with white sauce or use in soups.

MOLD AND DECAY.

(1) Cut through the skin of some vegetable or fruit with a knife dipped into mold or decay from another fruit. Watch day by day for changes.

(2) Put a whole fruit or vegetable and a piece of bread in a sterile jar, cover, and set away.

(3) Scatter spores of mold in a jar and then put in the jar a bruised fruit or vegetable and a piece of bread like that used in the previous experiment. Cover and leave for several days beside the other jar.

YEASTS AND FERMENTATION.

(1) Experiment on the effect of temperature. Blend one yeast cake thoroughly in a pint of water to which has been added one tablespoon of sugar.

(*a*) Freeze a portion of the mixture, then allow to thaw at room temperature.

(*b*) Boil another portion and cool to room temperature.

(*c*) Take a third portion at room temperature.

(*d*) Chill a fourth portion.

Fill bottles from each of the above and invert them on plates. Keep (*a*), (*b*), and (*c*) at 32° to 37° F. and (*d*) packed in ice during the remainder of the lesson period. Explain results observed.

Yeast muffins, etc., may be made in the usual way and also with the addition of strained pulp of fruit or vegetables, such as white or sweet potato, apples, squash, or pumpkin, and mashed parsnips. These may be used interchangeably.

If there is time in connection with the lesson, breads should be made wholly or in part with flours made from bananas, chestnuts, potatoes, soy beans, or such other substances of like vegetable origin as can be secured.

Some writers on cookery consider such addition as adulterations of bread, but they deserve recognition for the variety thus afforded.

REVIEW QUESTIONS, LESSON IX.

1. Describe any mushrooms you know to be edible.
2. Can you describe any poisonous fungi?
3. How do mushrooms rank in nutritive value?
4. What is the source of the various leavening agents used in breads, etc.?
5. Tell all you can of yeast, its nature, method of use, etc.
6. What vegetables are sometimes combined with flour for making bread?
7. In what proportions are cream of tartar and soda used and why?
8. Mention uses for soda without cream of tartar.
9. How may foods be guarded from ill effects of molds and ferments?
10. What form of fungi commonly attack fabrics?

LESSON X. CONDIMENTAL VEGETABLE FOODS AND FOOD ACCESSORIES.

The value of appetizers or food accessories is generally recognized. The words condiment, herb, and spice are used somewhat indiscriminately, but together refer to various vegetable products used in small quantities to add flavor where it is lacking or to develop natural flavors in food. The terms may include such vegetables as radishes and water cress, which are served in their natural state; flavoring materials, such as spices, savory herbs, and extracts used in general cookery; and prepared sauces, pickles, etc., in which some mild-tasting material like watermelon rind usually serves to carry a combination of flavors. In whatever form they may finally appear, the majority of these flavors are due to the volatile oils or similar bodies developed in the plants from which they were obtained.

The actual quantity of these articles in any one dish is usually so small that their nutritive value can hardly be counted, but nevertheless they are important, because they may make otherwise insipid or monotonous foods more palatable and so render them more digestible.

Beverages like tea and coffee, such materials as sugar and oil when used mainly for flavor, vinegar, and other food accessories are also considered in this lesson.

CONDIMENTAL VEGETABLES AND PREPARED RELISHES.

Under this head may be included many vegetable products, such as peppers of various sorts, mustard, and horse-radish, and a host of preparations or compounds designed to give zest or enjoyment to the act of eating and to aid digestion. Various pickled fruits and vegetables, the preparation and use of which is discussed in a later lesson, should be mentioned in this connection.

Some materials of East Indian origin, such as curry, chutney, catsup, and tamarinds, are well-known relishes. Tomato, apple pulp, etc., are likewise used as a medium for combining many spices and condiments. Mushroom and walnut juices are used for the basis of table sauces. Sassafras leaves, when young and tender, are used in some localities to thicken soups, etc., and, like okra, supply a mucilaginous material.

FLAVORING MATERIALS.

HERBS.

The herbs properly include the herbaceous or green portion of certain annuals, biennials, and perennials that are used green or dried, and usually in a chopped or sifted form, in sauces and stuffings. The word is also used to include the medicinal plants which once were grown or gathered and stored by every housemother. By the way of further distinction, the herbs used for flavoring were often called savory herbs, and those which were cooked for use alone were called potherbs. (See p. 14.) Among the herbs most used in the kitchen are marjoram, sage, summer savory, thyme, mint, parsley, dill, tarragon, bay leaves, and sweet basil. These are combined with meats or used generally in unsweetened dishes.

SPICES.

Spices, with the exception of pepper, red pepper, and mustard, are associated mainly with sugar in common household use. Some spices, as nutmeg and mace, are used in meat dishes and with vegetables in continental cookery, and much less commonly by American cooks. Cloves are also used in a limited way in meat cookery; for instance, they are often stuck in a ham before baking.

Other common spices are allspice (pimento), cassia, cinnamon, ginger, mace, nutmeg; aniseed, caraway, cardamom, and coriander are less generally used.

FLAVORING EXTRACTS.

Vanilla is perhaps the most popular flavoring extract used in home cooking. Almond and lemon extracts, too, are common. These three and rose and orange, when true to name, are made directly from the natural products. There are some kinds of flavoring extracts, however, which apparently are made from the fruits, but really are made synthetically. Since true vanilla is the most expensive flavoring material, it is wise to reduce its use where economy must be practiced and to substitute other flavors and spices in small amounts. They are often used too freely and the result is unpalatable.

Condimental foods are especially liable to adulteration and sophistication. There are usually several grades of the pure article, and the housekeeper should try to learn the differences between them.

BEVERAGES.

TEA.

Tea has been used as a beverage from remote ages by the Chinese, and is probably in more general use than any other hot beverage. Leaves of many other plants have been substituted for tea—Labrador tea or pennyroyal, for instance, in the United States—particularly in times of scarcity. The maté or Paraguay tea is a common beverage of South America, made from the leaves of a species of holly.

COFFEE.

Coffee has been known in Arabia and Persia from ancient times. Its introduction into England was accomplished with difficulty. The United States consumes about half of the world's supply. The amount used is not far from 1 pound per person a month.

CEREAL COFFEE.

Parched cereals are commonly used for making a hot beverage. Many sorts are on the market, and home parched grains for this purpose are easily prepared.

CHOCOLATE AND COCOA.

Chocolate and cocoa may be classed with other beverages, though they are foods in themselves, and, as usually served, are combined with a larger proportion of milk and sugar than are tea and coffee. These are products of an American plant apparently introduced into the Old World shortly after the discovery of this country.

FOODSTUFFS WHICH HAVE CONDIMENTAL USES.

Sugar and olive oil, peanut oil, cottonseed oil, and other vegetable oils have condimental uses, but should not be thought of simply as food accessories, since they are valuable foods and have a high energy

value. Sugar is, of course, used in large quantities, and vegetable oils, already fairly common, are each year assuming more importance for culinary and table purposes.

Vinegar, which is one of the oldest condiments, may be classed as a food accessory, and has little or no food value. It will be considered further on in relation to the preservation of food materials.

EXERCISES, LESSON X.

FLAVORING MATERIALS.

Materials needed.—Samples of spices, herbs, etc., in different stages of preparation; 2 lemons, 2 oranges, 1 vanilla bean, a few lumps of sugar, some powdered sugar, alcohol, bottles—lemon extract.

Spices and herbs.—Cover the labels on the spices and see how many the students can distinguish by sight and taste. Other tasting contests may be arranged. Cook whole spices in water or sugar sirup and taste each combination. Try similar tasting exercises with herbs, steeping in vinegar instead of boiling in sirup.

Flavoring extracts.—Wash and dry lemons and oranges. With lumps of sugar rub surface of one of each till sugar absorbs some of the yellow flavoring oil. Use them to sweeten and flavor sirups or custards.

Cut fine, thin strips of the yellow rind only, put in bottles, cover with alcohol, and leave for several days. The extract may after a time be drained off and the peel discarded.

Divide the vanilla bean and pound part of it in a small mortar with powdered sugar. Sift the sugar and keep it to sweeten and flavor. The particles of the bean removed may be steeped in milk for custards, etc. The other portion of the bean may be put into alcohol.

BEVERAGES.

Materials needed.—Any available samples of teas, coffees, cocoa, and chocolate; filter coffeepot.

Tea, coffee, cocoa, and chocolate:

1. Soak tea or coffee in cold water; notice color and flavor or lack of it. Bring to boiling point and again taste.
2. Pour rapidly boiling water over tea, or infuse with tea ball. Let boiling water drip through coffee in a strainer or filter coffeepot.
3. Boil tea and compare color and strong flavor with that made properly, as in experiment 2.
4. Boil coffee in uncovered saucepan. Note loss of aroma.
5. Any available "patent" coffeepots may be tested and the result compared with the right use of the simplest appliances.
6. Soak different grades of tea in water, unroll the leaves, noting size of leaf, proportion of stem, etc.
7. Test different samples of coffee for chicory and other adulterations. When mixed with cold water pure coffee floats on top, while adulterations, especially chicory, sink and give a brownish color to the surrounding water.
8. Prepare cocoa and chocolate in different ways and compare flavor, nutritive value, and cost of each.

REVIEW QUESTIONS, LESSON X.

1. How does the cost of flavoring materials compare with their actual nutritive value?
2. What can you say of the food value of the three principal beverages commonly served hot?
3. What is the best method of making tea, and in its preparation what special points must be safeguarded?
4. What simple tests will indicate presence of adulterations in coffee?
5. Distinguish between chocolate and cocoa. Tell how to prepare each.

LESSON XI. SUMMARY OF COOKERY.

Having briefly studied some of the most important groups of vegetable foods, the students are better prepared to classify methods of cooking and see how they may be adapted to developing the best qualities of plant foods.

The chief objects of cooking vegetables are these: To sterilize any from doubtful sources; to soften or separate the woody fibers; to make the carbohydrates more accessible to the digestive juices; to modify and develop flavors; and to put into attractive form for the table.

The principal processes of cookery for vegetables are the same as for meats—baking, boiling, and frying, with their modifications; but these must be adapted to the nature of the specific vegetable.

There are classifications of vegetables according to their botanical families and the parts of plants represented or according to their composition as green or watery, starchy, nitrogenous, fatty, etc. In discussing the use of different varieties in the kitchen these groups are not always considered as they should be. Instead of studying the structure and the food value of a vegetable, which would aid in showing the best way to prepare it, too often every type is treated in the same fashion.

For convenience of the cook, all vegetables may be classed as either the fresh, which are ready for cooking, or the dry, which must be thoroughly soaked before using, and the canned, which may be used by simply heating and seasoning, or in many other ways. Furthermore, with both fresh and dried vegetables, it should be considered whether they are strong in flavor, in which case they should be cooked in water first to remove some of their juices, or sweet or well-flavored, and to be prepared in such a way as to retain as much of their natural flavor as possible. Yet here the age and condition of each specimen must be considered and the dividing lines between sweet and strong can not be made hard and fast; the young and perfect forms of the stronger types may be much sweeter and better flavored than old and imperfect samples of the sweet-flavored kinds.

CHOOSING, SORTING, AND CLEANING VEGETABLES.

Careful choosing, sorting, and cleaning should precede any process of cookery.

Medium-sized vegetables are always to be preferred to the overlarge.

Plants grown slowly are liable to be tough and corky, while those having abundant moisture and sunlight are crisp, tender, and well flavored.

The shorter the time and journey between garden and table the better for green plants. It is wiser not to gather vegetables while they feel the effects of the midday sun, but rather to pick them after the dew has evaporated in the morning, or, if that is not possible, in the cool of the late afternoon.

Wilted vegetables can never be wholly satisfactory, but may be improved by careful washing and removal of inferior portions, and then soaking in cold water, or, in the case of salad plants, by wrapping in a damp cloth.

The soaking of vegetables in cold water to freshen them probably extracts some of the valuable saline matter. When they are blanched in hot water or parboiled still more mineral matter is lost. If boiled in considerable water, of which no use is made, some of the soluble saline matter is wasted. This mineral matter is generally conceded to be valuable. It would be of great importance if the dietary were such that little was obtained from other sources, such as fresh fruits, salad plants, and other foods with a reasonably high ash content. It has already been indicated how the waste may sometimes be avoided by using the water for soup.

Often it is convenient and wise to cook a double portion of a vegetable and serve part of it a second day in a different form. This should not be attempted in warm weather unless a refrigerator is available. Ordinarily a vegetable well salted while cooking and drained and cooled quickly will keep 24 or 48 hours in cool weather.

A double quantity of potatoes may be cooked one day, part to serve as plain boiled or mashed to-day while the firmer ones are reserved to broil or grill in slices, fry, or cream the next day. When gas or oil is the fuel this is an economy as well as a convenience, for it would take 30 minutes to boil fresh potatoes and only 10 minutes to reheat them.

Most vegetables are lacking in fat, so it is added in some form while preparing them for the table or they are served with fat meats, etc. So far as the need of the human body goes it makes little difference whether this fat is in cheap or expensive form, whether the vegetable is cooked with fat or dressed with cream or salad oil; one form may be more agreeable to some than another.

Beef suet, bacon fat, cream, butter, and olive and other vegetable oils are all used. Better results often are obtained by combining cream with vegetables than by using butter and milk costing quite as much. There is little difference in expense between the best olive oil and thick cream. The oil keeps better and hence always may be available. A taste for salad oils is desirable and should be acquired.

Whenever a vegetable dish, other than beans, etc., is to be the principal part of a meal, it is easily possible, as well as reasonable, to increase its food value by the addition of milk, cheese, or eggs. Skim milk may be heated uncovered until considerable water has evaporated, then little or no thickening is needed.

For composition of cereals, rice, etc., which are used as vegetables, see reference No. 9.

Although almost any vegetable may appear as soup or purée, scalloped, in salad, or as the basis of croquettes, fritters, or soufflés, the simplest way of preparing each is usually the best to develop its natural advantages, and a fair sample of any vegetable is not improved by overmanipulation or additions that disguise its own flavor. Intricate dishes have their place for emergency or variety. If the supply of any given vegetable is limited, combinations with other materials are in order. When there is an abundance of one kind, and it must be the main dependence for weeks, the form of serving it must be varied or it becomes tiresome.

Just as one kind of starch may be used in place of another, so the pulp and fiber of one kind of vegetable may be substituted for those of another in such dishes as "cream" vegetable soups. Similarly any two or more vegetables whose flavors combine well may be used in the place of one, as for example, beans and squash or potato and turnip.

COMBINATIONS OF VEGETABLES.

There are many combinations of vegetables which have proved satisfactory, and no one need hesitate to experiment with others. In general it is safe to combine a starchy vegetable with a succulent one, or one lacking in flavor with another that will give relish.

Cooked celery is agreeable with creamed potato. It may be added to Brussels sprouts or cabbage.

Contrasts in color often add to the value of a compound by making it attractive to the eye, as in carrots and green peas. Since some combinations of color are not considered pleasing, on this basis it is well to beware of serving tomato and red beets together, etc.

Green corn with potatoes and onion, with the addition of milk, etc., makes as good a chowder as fish in the opinion of many.

Potatoes boiled and cut into slices or cubes may be used to extend expensive, highly flavored vegetables in salads, etc.

Potatoes with onions or white turnips make a more agreeable soup for some palates than the stronger vegetables alone.

Carrots often are more palatable cut into dice and blended with green peas than served alone.

Large white beans may be served in a tomato sauce with onion and green or red sweet peppers or both.

Mint, parsley, sweet peppers, onions, etc., may be added in small portion to many vegetables to give a new flavor when the usual methods of serving have become monotonous.

UTENSILS USED IN COOKING VEGETABLES.

The following suggestions as to utensils may be of practical use: A small scrubbing brush is essential for washing all vegetables that have grown in the earth, and should be kept in a convenient place, and used for this purpose only.

Knives of different types are desirable. A small, sharp point is needed for the removal of eyes from potatoes and small blemishes from any vegetables.

Fancy cutters are not essential, but convenient, especially when it is necessary to give variety to a monotonous diet.

A wire basket is convenient to hold greens, string beans, or even potatoes while cooking, as thus they are less likely to adhere to the bottom of the kettle, and often it is easier to remove the basket than to drain off the water.

Colanders, purée strainers, potato ricers, etc., are all helpful in washing and straining potatoes, squash, etc.

A potato masher of strong, continuous wire, the two ends inserted in a wooden handle, is inexpensive and fully as satisfactory as a more costly style.

TIME OF COOKING.

While overdone vegetables are not desirable, underdone ones are often even less appetizing; therefore it is wise to start in season and stop the process as soon as the plant is tender, and then reheat quickly just before serving. Most time-tables in cookbooks do not take into consideration the variations in time required for the same kind of vegetables at different ages.

WAYS OF SERVING.

SOUPS.

This is one of the best ways to use left-over vegetables. A cupful of cooked cauliflower with some of the water in which it was cooked and an equal amount of milk and a slight thickening of butter and flour will provide a cream of cauliflower soup. If the vegetable

already has white sauce with it, reduce it with milk to right consistency, season, heat and strain, and the soup is ready.

A purée is halfway between a cream soup and mashed vegetables; it is sometimes a thick soup, but oftener strained vegetables made soft with milk or stock and butter, and served with meats.

SALADS.

The derivation of the word—something to be eaten with salt—shows its original simplicity. Now the term is applied to combinations of all sorts of food materials that may be served cold with a dressing but more particularly to those which are dressed with oil (or other fat) and vinegar (or other acid, as lemon juice), salt, and other seasoning. The young tips or tender leaves of certain plants, as lettuce, dandelion, etc., are especially suited to this purpose. (See Lesson II.)

SCALLOPS.

These consist of cooked vegetables with cream sauce or milk, seasoned, covered with buttered crumbs, and browned in the oven. The proportion and thickness of sauce varies with the dryness of the vegetable, usually half as much sauce as vegetable in the case of cabbage or onions.

FRITTERS.

Many vegetables, partially cooked, may be dipped in batter and fried in deep fat, thus giving variety and adding material of a different type from their constituents. This may be seen by looking up fritters in any large cookbook. Among the vegetables best adapted to this process are cauliflower, celery, corn, okra, and salsify.

CROQUETTES.

These may be made from mashed vegetables held together with a small proportion of beaten egg or from chopped, cooked vegetables combined with a thick cream sauce. There is justification for the additional time required for this process when left overs can be thus used economically or when variety is needed. From the potato cake or croquette it is but a short step to a potato crust for a meat pie or from the corn fritters to the tortilla, and thus to doughs.

EXERCISES, LESSON XI.

Materials needed.—Take any available vegetables not previously used in the practice lesson and prepare them in any of the standard forms.

Use any formula proved successful for some vegetable and substitute another vegetable with due variation in other ingredients to adapt the formula to the composition of the substitute.

For example, a cream soup may be made with any cooked and strained vegetable pulp, but if in one case it is potato with much starch and little flavor

little thickening and more seasoning will be needed, while with celery or onion more thickening and less added flavor will be required.

Exercise.—Make two green-pea soups, using for one the dry split green peas at about 14 cents per quart, and for the other canned green peas at the same price per can. Count cost of materials, time, and fuel in each case.

REVIEW QUESTIONS, LESSON XI.

1. Briefly describe the principal processes of cooking which are applied to vegetables.
2. What general preparation would be common to all methods?
3. When may it be advisable to cook a double portion of any vegetable?
4. How shall it be decided what materials to add to a vegetable in its preparation for the table?
5. What types of knives are most helpful in preparing vegetables? Describe different processes requiring different motions.
6. Some vegetables should be scraped; others pared. Give examples.
7. Describe several utensils helpful in preparation of vegetables.
8. Suggest combinations of vegetables and explain why they are acceptable.
9. Give general plan for making soups from one kind of vegetable. Mention combinations that might be used in the same way.
10. Describe process of making croquettes or some scalloped vegetable.

LESSON XII. DRYING, EVAPORATING, AND SALTING VEGETABLES.

Most foods are best when fresh, but since they can not always be had in this condition some means must be found for preserving them. Decay in fruit or vegetables changes texture and flavor and is caused by the development of bacteria, spores, molds, and other low forms of life. Methods of preserving are simply means of checking their growth. The first step should be to protect the material from unnecessary contamination from them, but since they are everywhere present in the air even the most scrupulous cleanliness is hardly sufficient alone.

Most of these microorganisms grow only in the presence of moisture, and this fact explains the method of preserving by means of drying.

DRYING AND EVAPORATING FOODS.

The drying of foods has been practiced by primitive people from the beginning of civilization and is only aiding nature's processes. The seeds dry as they ripen and berries dry on the bushes. The Indians preserved blueberries and other fruits in this way. Pumpkin was often dried in strips by the early colonists, and sections of apple were strung and hung where they would dry readily. The bulk and weight of such foods is much less than in the natural condition, hence less room is required for storage and much less labor is involved in transporting them from place to place.

Herbs and spices were gathered, dried, and used to aid in the preservation of other foods. There was a right time for gathering each plant, it was believed, and in this lore ancient housekeepers were far more interested than modern ones.

Dried lavender, sweet grass, clover, and rose petals have from time immemorial been used by housewives to perfume their linen chests.

Dates, figs, and raisins long have been considered important foods for the traveler and explorer, containing valuable food material in concentrated and convenient form.

Modern, evaporated fruits and vegetables differ from dried, simply in that the process is shortened, and there is less opportunity for fermentation, darkening, or the accumulation of dirt.

Dried fruits and vegetables, as a general thing, are less expensive than canned, mainly because they have required less labor in preparation and transportation. Their value is not generally appreciated, partly because they are cheaper, partly because the older dried products were often damaged by dust and insects, and partly because sufficient attention is not given to freshening them and preparing them for the table by good methods. The good modern methods of drying and marketing are a great improvement on those of earlier times, and yield a cleaner and more sanitary product. Dried fruits and vegetables, properly soaked and cooked, are very palatable and are wholesome, useful products, particularly when the fresh ones are not available.

A homemade drier is a desirable appliance for the possessor of a good vegetable garden. A simple form consists of trays in a holder; four strong, upright, wooden supports, connected by horizontal bars, will hold several trays at once. The trays are made like window-screen frames and may be covered with wire netting for some things, but cheesecloth is preferable. The supports should be tipped at the base with a large nail or piece of metal that they may safely rest on the back of the stove when sunlight is not available. Shelled beans and green peas may be dried in this fashion. Some find it an advantage to scald them in boiling water before drying. Sweet corn should be slightly cooked, cut from the cob, and spread in very thin layers on the cheesecloth. Corn on the cob may be dried after scalding.

Small quantities of vegetables may be evaporated on earthen plates set over a kettle of boiling water or in an afternoon oven. While drying, they may hang in cheesecloth bags at the top of a warm closet. When very thoroughly dried, put away in tin boxes or glass jars.

Tomatoes may be cooked, strained, and evaporated to a thick paste, resembling beef extracts in texture, which must be filled at once into containers and tightly closed. In this form they are found in Italian markets, and can also be prepared by the housekeeper herself.

PRESERVING BY SALTING.

Salt hastens the drying process by drawing out water from the vegetable tissues, making them firmer; it also hinders the growth of

bacteria. Young cucumbers and other green vegetables often are packed in salt as they are gathered and then kept until a convenient time comes for their further preparation for pickles. Greens, string beans, and similar vegetables used to be packed in salt like young cucumbers. Thoroughly freshened in the winter, they afford an agreeable variety. Now canned vegetables are more convenient.

Smoking is very commonly combined with drying and salting as a means of preserving foods, but almost exclusively with meats and fish.

Sauerkraut, a German preparation of cabbage, is evidently the survival of an ancient way of preserving the vegetable. The process is somewhat akin to the ensiling of forage for animals. Domestic methods vary more or less. According to one recipe, firm cabbage is sliced, packed with alternate layers of salt (sometimes a few caraway seeds are added), and the mass is pressed down solidly under a weighted cover. After a little while fermentation takes place and the liquor which rises to the top is poured off and more salt and water added. According to another method, finely cut cabbage is mixed with salt and packed solidly into a cask or other container. In about six days scum will rise to the top of the liquor which collects on the top of the sauerkraut, and should be removed. The cask or other container should stand in a cool cellar. In about two weeks more the kraut will be ready for use. Experienced housekeepers know that the sauerkraut should be covered with a piece of board scrubbed until it is clean, with a well-scrubbed stone on top of the board to weight it down. The acid developed by the fermentation works upon the tough fibers of the cabbage leaf, making them more tender. Sauerkraut should be kept in a cool place, and when needed should be squeezed as dry as may be and cooked like fresh cabbage.

Cucumbers packed in salt will undergo fermentation, a fact taken advantage of in home pickle making. The salted cucumbers can be freshened from time to time in the winter and pickled in vinegar. Dill pickles are made with cucumbers packed in a similar way and flavored with dill, a seasoning herb which finds a place in many old-fashioned gardens.

From similar methods other types of pickles may have been evolved.

EXERCISE, LESSON XII.

DRYING VEGETABLE SUBSTANCES.

Materials needed.—Frames covered with cheesecloth or white mosquito netting; these may be sections of boxes, even of heavy pasteboard.

Exercises.—The essentials in drying vegetables are cleanliness, heat, and circulation of air. The more rapid the process the less the danger of bacteria, ferments, and molds.

(1) Arrange part of the vegetables on the frame and expose in current of air, or place part in a very moderate oven with the door open, or in upper portion of an uncovered double boiler, and compare the results.

(2) Place pieces of different thickness side by side and dry under the same conditions. Cut a carrot in fancy shapes and dry for soup garnish.

(3) If possible, try (*a*) green or undeveloped tissues, (*b*) fully grown or ripe and overripe; compare results.

(4) Weigh and measure vegetables or fruits as purchased; weigh and measure after process of evaporation is completed.

(5) Dry parsley; note effect of too much heat in change of color. When dry, rub through strainer and use like fresh chopped parsley. Plunge in boiling water before drying and compare result with other not so treated.

(6) Try experiments with thick sections or with thin ones placed over each other, exposed to dust where process must be slow, without sun or heat, and note results.

(7) Test effect of alcohol, oil, vinegar, sugar, salt, and spice separately and two or three together on similar sections of the same fruit or vegetable, raw and cooked.

(8) Test effect on similar sections from the same article, thus: (*a*) Refrigerator, (*b*) in sunlight, (*c*) in moderate oven, and (*d*) in dusty room.

RESTORING DRIED FOODS TO THEIR ORIGINAL CONDITIONS.

Reverse the experiments just described by soaking dry vegetables and fruits, such as evaporated apples, beans, cherries, peas, peaches, prunes, sweet corn, etc. Weigh and measure these as purchased; weigh and measure after soaking. Make tea, unroll the leaves and note shape; make teas from herbs.

Nuts are a type of dry or condensed foods which may be studied in this connection.

Exercises.—Take 1 pound of mixed nuts in shells, or one-fourth pound of each of any available kinds. Weigh before and after shelling. Note composition of each type. (Ref. Nos. 12, 14, 26.) Suggest additions and combinations with other food materials to dilute the nuts and make a food which in composition might be similar to a meat and potato hash or legumes stewed with pork.

REVIEW QUESTIONS, LESSON XII.

1. What objects are sought in the preservation of vegetables?
2. Describe methods used before the process of canning was discovered.
3. Explain the effect of air and sunlight on canned foods.
4. Mention appliances helpful in any processes of preservation of vegetables.
5. Explain the action of salt, sugar, spice, oil, vinegar, alcohol on vegetable tissues.
6. Contrast processes of drying and canning, giving the relative merits of each.
7. How is the large percentage of water in vegetables shown in any method of preservation?
8. What is the relative proportion of nut meats to shell, both as to bulk and weight?
9. Mention points for and against buying shelled nuts or seeded raisins, etc.
10. Estimating cost of jars, fuel, etc., allowing a fair price for labor, what does it cost you per jar to can your own fruits and vegetables? How does this compare with drying?

LESSON XIII. PRESERVING AND CANNING VEGETABLES.

The home canning of fruits and vegetables is a matter of more importance to those who grow such products than to those who must buy them in any case. The cost of labor and fuel, added to the cost of the raw material, makes it wiser for many to buy the canned article. But there is no question that the surplus products of the home garden should be preserved in some form for future use. A number of the publications of the United States Department of Agriculture treat different phases of this subject fully and can be used as supplemental textbooks for lessons. (See especially Ref. Nos. 1, 4, 5, 6.)

The essential points in all canning are few—absolute cleanliness, good sterilization, and suitable containers—which mean the destruction and exclusion of molds, bacteria, and spores.

Poisonous or doubtful preservatives never should be used. The housekeeper should limit herself to the use of the approved household preservatives, such as spice, vinegar, salt, wood, and smoke. The use of sugar, salt, vinegar, and spices as flavorings has gone on so long that it is frequently forgotten that such use is very often secondary to their preservative effect.

A practical point worth remembering in canning and preserving is that, roughly speaking, 1 quart of some vegetables, for instance, spinach well packed down, onions, and cranberries, will weigh practically a pound, while with others, such as apples, cucumbers, and peas, the weight of a quart would be more nearly 2 pounds. When canning vegetables or preparing them for the table it is well to remember that on an average a quart of vegetables, as purchased, will be required to fill a pint jar or dish; the shrinkage being due to loose measure, the removal of skin, and other inedible portions, and condensation in cooking.

PRESERVING WITH SUGAR.

The earliest method of preserving fruit aside from drying appears to have been to coat it with honey and allow it to dry somewhat. From that may have been derived the plan of packing in jars and filling the spaces with strained honey. This might have been the result of observation of the way in which flowers, etc., accidentally coated with honey retained their original freshness. In any case it was unconscious application of the fact that bacteria and molds do not grow readily in the presence of concentrated sugar solutions.

Preserving with sugar is, of course, more important for fruits than for vegetables, but is worth consideration here, partly because it shows an important principle in the general science of food

preservation, and partly because a few vegetables are sometimes put up in sugar. (Ref. No. 7.)

Dates, figs, grapes, and other fruits rich in sugar have always been known to keep well when only partially dried, and others less sweet have been dried with the addition of a little sugar. The old-fashioned New England custom of drying wild raspberries with maple sugar is an illustration of the latter, and also of how necessity sometimes leads to the discovery of pleasant flavor combinations.

Although sugar is a good preservative against bacteria and molds, it is not so efficient against the yeasts which cause fermentation; hence the occasional "spoiling" of even fairly sweet fruit preserves and the need of keeping them in clean, tight jars.

If the products commonly classed as vegetables were preserved in sugar, their sweetness would spoil them for their ordinary uses in the bill of fare. Where fruits are scarce and expensive, women have been ingenious in the use of vegetables in place of them. Thus the seed vessels of roses are sometimes made into preserves in northern Europe. Pumpkin, squash, carrot, even beet and cabbage are used in this way and flavored with lemon, ginger, etc. Certain kinds of tomatoes, also, such as the yellow plum variety, are frequently preserved in sugar, but they are so sweet in this form that they are used as a dessert rather than in the meat or salad course. Small quantities of sugar are sometimes used in canning such vegetables as green corn and peas.

Since sugar and other sweetening materials are of vegetable origin they may be briefly mentioned here. Honey already has been considered among the flowers. Maple sirup and sugar making were known to the Indians, who recognized a "sugar-making moon" in the spring. A study of the history of methods of condensing the sirup, from the primitive appliances of a century ago to the improved evaporators of the present, would be of interest and suggest possible advance in household methods of cookery.

Cane sugar is a popular and valuable food, and its use appears to be increasing everywhere. That large quantities of it taken at any one time are generally conceded to be unwholesome is not surprising, since overeating of any food is likely to result in unpleasant consequences and is to be avoided.

Statements are sometimes made that sugar is not a wholesome food but this is by no means the commonly accepted view. As a recent writer on hygiene states, "Sugar is of especial value because it is so readily available for use by the system. It needs but little change in the chemistry of the body before it becomes capable of absorption and utilization." (Ref. No. 15.)

Granulated and other white sugars are the most important products of sugar cane, but brown sugar and molasses also play a useful

part, not only in those sections of the Southern States where molasses is a large factor of the diet but also in general cooking. The old-fashioned somewhat acid molasses was the result of evaporation in open kettles, a process rarely followed now.

During the last half century there has been a marked increase in the production of sugar from special varieties of beets. So far as the chemist can discern, this sugar is identical with that made from sugar cane.

The use of a natural sweet sirup, honey, has been spoken of elsewhere (p. 36).

Sorghum sirup, which is not an uncommon domestic product, is less used since corn sirups have been manufactured.

That sugar is present in a number of vegetables can be easily shown by evaporating the water in which sweet vegetables, like carrots, peas, or squash have been boiled. A small amount of sweet sirup will be obtained, but it is not always palatable since it contains mineral substances and other constituents as well as sugar.

PRESERVING BY STERILIZATION—CANNING.

In ordinary sweet preserves the heat of cooking may increase their keeping qualities by killing some or all of the microorganisms present in the raw material. It has been shown that such sterilization is one of the reasons for cooking vegetables. It is the most important factor in canning vegetables, whether in the home or in the factory.

Prolonged or extreme heating tends to change the flavor and texture of foods, sometimes for the worse. The best method of canning, therefore, will be the one which kills the most of the undesirable microorganisms, while it occasions the least injury to the material. Whatever method is used, the receptacles in which the food is put must be sterilized as carefully as the food and finally closed so tightly that no fresh organisms can find entrance.

The method known as intermittent or fractional sterilization usually answers all these conditions. In this method, the vegetables, after blanching in boiling water, are put into jars, the rubber rings and glass covers are laid on but not clamped, sterilized water is added, and the jars heated to the boiling point of water for about an hour; then the jars are fastened. This process is repeated with clamps up 24 hours later, and again the third day. This method is tedious, time consuming, and expensive, and hence not best suited from a practical standpoint to the canning of cheap products, such as greens, peas, okra, sweet corn, and Lima beans. It is, however, considered the only thoroughly safe method under certain conditions, such as prevail at high altitudes and in damp, warm regions, and for this reason is recommended by the Department of Agricul-

ture for use in the home-canning work in the South. In the home-canning work in the Northern and Western States, on the other hand, simpler and cheaper methods have been used with marked success. The one preferred and now in general use is known as the cold-pack method. In this method the vegetables are first blanched in live steam for a few moments, then plunge quickly into cold water, from which they are removed and packed in the containers. A little salt and hot water is added immediately, the containers sealed (glass jars partially, tin cans completely), and processed for a period of time, depending upon the outfit used and the product being canned. (Ref. No. 6.)

Vegetables should, if possible, be canned the same day they are gathered.

Where the source of the vegetables is uncertain it is a safeguard to blanch or parboil them in well-salted water and drain thoroughly before packing them in the jars for either the fractional or the continuous process. A small quantity of cooking soda may be added to the water in which string beans are parboiled and which is not used in the canning process. As vegetables are salted before serving, from 1 teaspoon to 1 tablespoon of salt is frequently added to each jar.

The relative economy of the use of fresh vegetables and canned ones involves many problems, including convenience, value of time and labor, as well as variety and quality of the foods.

Compare canned green peas with fresh ones in the pods out of season and the advantage is with those from the can as to quality as well as cost. But canned or fresh at the lowest rates for either are expensive compared with the amount of nutriment obtainable for the same money from the dry green or split yellow peas.

To illustrate this matter in detail: A 15-cent (pint) can of Lima beans yielded 150 beans. The same number of dried Lima beans, which are a common domestic as well as a commercial product in some localities, would weigh a little over 5 ounces, or a third of a pound, and measure less than 1 cupful. The cost of these beans was 9 cents per pound. In other words, the dried beans would cost 3 or 4 times less than the canned beans, and with a fair allowance for fuel and labor the total cost, when prepared for the table, would be less than one-half that of the canned beans.

The larger the family the greater the gain in the use of such dried beans, for even at wholesale rates the cost of the canned would be greater than that of dry beans plus the labor and fuel required for the preparation of the latter.

However, both kinds are wholesome and palatable. Knowing this the housekeeper can choose according to her circumstances and preferences.

Because this happens in one instance it does not follow that it will in others. Some of these questions, as that of canned beets versus fresh, etc., may be worked out in the practice period. In general, it will prove that the fresh vegetable directly from the garden in its season is always superior to the canned, and that a dried fruit or vegetable properly soaked and cooked will rival all but the very highest grades of canned foods of the same kind.

To use canned vegetables, open an hour or more before using; empty the can as soon as opened and expose the contents to the air to freshen. To freshen quickly, drain the vegetables and rinse with cold water. Taste of the liquor in the can and use or discard as seems best; do not keep it long after opening.

EXERCISES, LESSON XIII.

ACTION OF BACTERIA, MOLDS, ETC.

Exercises.—Expose bread, cheese, fruit juices, cut raw and cooked vegtables, milk, etc., to dusty air and leave for some time. Note changes in each. Note the cloudy appearance of fruit sirup, indicating presence of bacteria. Scald the sirup, remove scum, and sirup will be seen to be clear again.

Leave stewed fruit in glass jar uncovered. Note the difference in lower portions which do not come in contact with air. After a time stir slightly so that part of top layer is distributed throughout the jar. Note the groups of bacteria, etc., forming where portions of the top layer remain.

Note the need of sterilization of jelly bags, jars, utensils, and the danger from sweeping, dust from open windows, etc.

SUGAR.

An entire lesson might be given to a study of sugar and the way it is affected by heat and moisture. In reference No. 1 Miss Parloa has explained the preparation of sirups for canning.

CANNING.

Materials needed.—Any vegetables available, including tomatoes, either fresh or canned; apple or green-grape jelly, fresh mint, spinach extract for coloring. Several types and sizes of jars.

Exercises.—(1) Can any available fresh vegetable.

(2) When fresh tomatoes are not available open a quart can, reheat, and seal part in half-pint jar. This is a practical point for the small family where a larger can is too much to use at once. Another portion of the tomato may be strained and canned in a half-pint jar. The remainder, strained, may be evaporated to half its first bulk, seasoned with spices, salt, and vinegar, and put into bottles as catsup.

Note whether varying the kind of spices and the proportion of vinegar affects the flavor materially.

(3) Note results with different types of jars. Have different sorts of tops any special advantages?

Another lesson on this general subject might deal with the use of canned foods, as already indicated in Lesson VII with the tomato. (Cream soups may

be made from canned tomato, peas, asparagus, etc. Scalloped tomato and corn fritters are other dishes in which small quantities of canned vegetables may be utilized.

Combinations of high-flavored fruits with others of different flavor, or sometimes of less distinctive taste, are by no means uncommon. Thus, housewives often combine raspberries and currants for jelly making or for canning. Another combination which may prove useful, if lessons are given at seasons when fresh berries and fruits can not readily be procured, is raisins, oranges, and cranberries. The proportion is a matter of taste, so it is well for students to use different quantities and compare results.

In old domestic recipes quinces are often combined with sweet apples which have little distinctive flavor, or with pears of firm texture and also lacking in this quality. The relative proportion of the two fruits is a matter of preference; the greater the proportion of quinces the higher the flavor.

Such preserves can be made by the student if time permits. Note the texture of the different fruits when cooked.

Experiment with vegetable pulp, such as squash, pumpkin, sweet potato, or tomato, as a basis for marmalade, with flavor supplied by spice or a small proportion of high-flavored fruit like apricot or quince.

REVIEW QUESTIONS, LESSON XIII.

1. What kind of kettles would you choose for canning, and why?
2. What is the aim of this plan of preservation?
3. Has any case in your own experience shown the importance of sterilization?
4. Why are rubber rings used?
5. Give an outline of the process of canning based on your own experience.
6. How would you estimate shrinkage between market and jars, including imperfect vegetables, necessary refuse, effect of cooking, etc.?
7. What fruits and vegetables do you can at home?
8. What do you find it wiser to buy, and why?
9. Give details of relative cost to you of buying tomatoes to can or buying them already canned.
10. Does this lesson explain any failures that have troubled you?

(Ref. Nos. 1, 4, 13, Chaps. XI, XII.)

LESSON XIV. PICKLING VEGETABLES.

VINEGAR.

Vinegar is another substance which acts as a food preservative. Its name means "sour wine," and at least when a domestic product it is usually made from cider or light wine, in which bacteria give rise to fermentation and the production of acetic acid. This acid gives the vinegar its sour taste, and is very unfavorable to the growth of bacteria. When vinegar is used in pickle making the hard fibers of undeveloped vegetables, vegetable skins, etc., are softened by it. Spices and salt have much the same effect as vinegar on bacteria, though in a different degree. These preservatives, of course, entirely change the flavor of food in which they are used, and often set it among the condimental materials.

HERB VINEGARS.

Herb vinegars are useful for the housekeeper's store closet, as by their means a new flavor is easily added to a salad sauce. They may be prepared either in Lesson X or here by steeping fresh or dried herbs, such as tarragon tops, in cold or hot vinegar. Some of the more delicate flavors may be lost by heating, but the cold process is slower.

PICKLES AND SAUCES.

The word "pickle" is applied to the process of preserving foods, either with salt or vinegar, or both. Thus meats are pickled in brine, either a saturated solution of salt and water or the water which the dry salt draws out of the foods themselves, which are often three-quarters or more water. When the term is applied to vegetable foods it is commonly understood to mean preservation with vinegar, either with or without the addition of other materials, as salt, spices, or sugar. In some cases, as in dill-pickle making, the acid is supplied by the fermentation of the product itself and not by adding vinegar. The number and variety of fruits and vegetables used in pickle making is almost endless, cucumbers, tomatoes, onions, and green or unripe fruits being most common.

An old household name for pickles in which the flavor of vinegar predominates is "sour pickles." Those in which spices are particularly noticeable are frequently spoken of as "spiced pickles" or "spiced fruits," and those in which sugar predominates as "sweet pickles."

The transition is gradual from the acid fruits preserved with sugar and spice to the sweet pickles where somewhat tasteless vegetable tissue has been filled with vinegar instead of natural fruit acid and spiced and sweetened.

By using them for pickle making the thrifty housewives of earlier times contrived to make attractive most unpromising food materials as well as common fruits, etc., for instance, the rinds of the watermelon, the unripe windfalls from the fruit tree, martynias, cucumbers, ripe tomatoes, and the green tomatoes remaining when frost had killed the vines. Even young ears of corn 2 or 3 inches long are used for pickles. Though the kernels have already formed, the cobs are tender and will absorb the vinegar.

Some materials are more satisfactory for pickle making if first soaked in salt water to extract acrid flavors. Special treatment of this sort is required with such materials as green melons, but with the more common fruits and vegetables used in pickle making there seems to be little difference in results, whether they are soaked overnight in that fashion or whether they are parboiled in salt water.

By either process some water is extracted from the tissues, which are then ready to fill out with the prepared vinegar.

Old recipes for pickle making sometimes call for ingredients not now recommended. The use of alum to insure crispness or a brass kettle to "green" the pickles can not be advised. In these days when fresh fruit from all over the world is available, is the housewife justified in spending much time to provide many jars of highly seasoned condiments for her own family or her neighbors? This is a question the housewife should consider.

When the materials used in pickle making are so finely divided that the resulting product is a more or less thick fluid, they are usually called "catsups" or "sauces." Tomato is a favorite foundation, but many fruits may be cooked and strained for this purpose; decayed ones never should be used.

There are hosts of table sauces which, by their names, seem to be derived from the Orient. Consult a dictionary for the origin of some of these words: Catsup or ketchup, chili sauce, chowchow, chutney, etc., which are made in many ways from diverse materials.

CARE OF PICKLED AND CANNED GOODS.

Any canned foods or pickles should be well cared for. The stone jars with more or less tightly fitting covers formerly used may serve for very sweet or for highly seasoned material, but the glass or other jars with air-tight covers are more satisfactory for all purposes. Each household should have several sizes. Often a large jar is opened and not half its contents used. The remainder can be reheated and again canned in a smaller jar. All jars should be carefully labeled. When one lot of pickles has been used, the vinegar still may serve for partial preparation of another vegetable. The spiced sweet pickle vinegar is usable in several other ways; prunes or beets may be put into it or it may be used in mince pies or stiffened with gelatin to serve with meats.

EXERCISES, LESSON XIV.

Materials needed.—The materials needed for this lesson will depend on season and locality. Cabbage and onions usually will be available if nothing else is at hand. Citron melon, watermelon rinds, and green tomatoes are excellent for such lessons in late summer.

SIMPLE PICKLES.

A simple type of pickling may be observed by grating horse-radish or putting it through the food grinder and combining it with sufficient vinegar to moisten it.

Beets cooked in Lesson VI (p. 33) might be kept in vinegar until this lesson. If the jars were not entirely closed, mold may have formed on the top and yet the beets below be in good condition. They now might be put in a spiced sweetened vinegar, scalded to sterilize them, and canned.

COMBINATION IN PICKLING.

Almost any combination of onions, peppers, and tomatoes, ripe or green, will form an acceptable relish with vinegar and spices. The basis of the pickles may be of one kind or several, but in the latter case each should be parboiled separately, or some may be hard while others are overcooked.

Exercise.—Collect personal and family recipes for all types of pickles and refer to standard cookbooks dealing with the subject. With the aid of the blackboard, reduce these formulas to their lowest terms and arrange in tabular form. Thus it becomes apparent that it is not necessary to have so many recipes. Moreover, proportions may be adapted to conditions.

It will surprise the students to see how many recipes for sweet pickles may be condensed to some such form as this: For 2 pounds of prepared vegetables or fruit, 1 pound of sugar (or less), one-half pint vinegar, 1 ounce mixed spice.

The usual sauce for mustard pickles is some variation of this formula: Mix one-fourth to one-half cup sugar with 1 ounce ground mustard and 2 tablespoonfuls flour. Stir into 1 pint hot vinegar and cook until thickened. Turmeric may be added to give color. Combine with 1 quart mixed vegetables parboiled. Note resemblance between salads with cooked dressing and mustard pickles.

Salad oil, such as olive oil, cottonseed oil, or peanut oil, in small proportion is often added to mixed pickles or poured over the top after they are put in jars to protect them from the air and prevent the growth of molds.

To show that the natural acid of some fruits may have the same antiseptic effect as vinegar, put cranberries or rhubarb into sterile jars; fill the jars with clear, freshly sterilized water and seal; time will show that the fruit keeps as well this way as if cooked.

REVIEW QUESTIONS, LESSON XIV.

1. Define pickles.
2. What are essential steps in the process of pickling?
3. Describe the making of sweet pickles.
4. Mention some names of products of this type which indicate a universal demand for such foods.
5. Is there any reason why pickles and relishes should be less important now than formerly?
6. Why is vinegar useful as a preservative?
7. Are any fruits or vegetables ever pickled without vinegar?
8. What may be combined with vinegar to give it greater efficiency?
9. What need of caution in selecting utensils for pickle making?
10. Are exact recipes essential in the preparation of pickles?

LESSON XV. VEGETABLES FOR THE TABLE—MARKETING.

Savages found their food where they could, and dug roots, picked fruits, and pursued game from place to place. Such nomadic tribes required a large area to sustain a small population. The fixed hearthstone and planting of seeds were higher steps on the ladder of civilization, grazing succeeded the chase as a method of supplying food, and grazing and crop raising combined are the foundations of agriculture. The possibilities of intensive farming in the development of the food supply are not yet known. Moreover, the

skilled efforts of the farmer must be supplemented by equal intelligence on the part of the cook who handles his products.

CULTIVATING VEGETABLES FOR THE TABLE.

There is an increasing attention given to the cultivation of vegetable foods, with the result that the quality is better and the texture less fibrous. Less attention evidently is being given in this country to production of cakes and pastries, and the per capita consumption of flour appears to be diminishing as coarser cereals, fruits, and vegetables are used more.

Farmers are beginning to see more profit in the intensive cultivation of choice vegetables than in the larger acreage of less profitable crops. Too often a type of plant is chosen for its shipping or keeping qualities rather than for flavor and texture. The improved quality of fruits and vegetables gained by improved methods in agriculture is often more than offset by carelessness in packing. Good varieties should be grown by the best methods and handled and shipped so that they reach the consumer in satisfactory condition.

What is needed is greater knowledge on the part of the producer of the relative values of different varieties of the same plant, while the consumers must be discriminating in the selection of the special article for a given purpose or know in what way the available material can best be utilized.

The housekeeper unfamiliar with the country garden hardly knows when different vegetables are at their best, and may buy them at abnormal prices out of season and rely on canned vegetables when "natives" are abundant. Easy transportation, cold storage, and cultivation under glass have changed the times and seasons to a great extent, and while this is often an advantage, there is seldom the same desire for foods obtained at any time as there is for those available for a short season only. Producer and consumer should confer frequently to secure better food for all and better methods for its transportation and use.

Cold storage has advantages, but often is carried so far that there is distinct loss of quality or flavor, or both. With the lack of suitable storerooms in modern houses in large towns, housekeeping would be almost impossible without the storage facilities whereby dealers can hold food supplies in good condition.

GROWING VEGETABLES FOR THE HOME TABLE.

Women should be encouraged to take more interest in the vegetable garden. Even the actual work there is less taxing than much that is done indoors, which gives less valuable return in health and comfort.

Too many gardens are planted all at once. It is far better to leave open spaces and plant additional rows of lettuce, radishes, beans, and corn each week until after the middle of summer. Another important point is to prevent the maturing of any seeds if it is desired that plants continue to produce. Therefore cucumbers, summer squash, etc., must be kept closely cut, even when not needed for the home table.

WEIGHTS AND MEASURES.

There is need everywhere of enforcing definite standards of measure and weight, especially in cities where the average portion sold is small; the arithmetic of the vegetable market is confusing, and more uniform methods of measuring market produce should be adopted. For example, sometimes onions are sold by the quart, sometimes by the pound, or by the bunch. Four or six or more may constitute a bunch of beets or young turnips, etc., with little regard to the size of the individual roots.

As a recent publication of the Bureau of Standards, which deals with standards for the home, points out, the law in some States requires that dry commodities be sold by weight and in such States purchasers may demand that orders be weighed before delivery and the specified weight delivered.

In other States the statutes define the bushel as consisting of a stated weight, but do not require that dry commodities be sold by weight, although it appears to be the intent of the law that the weight specified must be delivered for a bushel whether commodities are weighed or measured.

Certain other States have established a standard weight per bushel for the standard common vegetables. Thus a bushel of potatoes would weigh 60 pounds; white beans, 60 pounds; carrots and parsnips, 50 pounds; turnips, 55 pounds; onions, 57 pounds, or about 2 pounds to the quart. In some States this is limited to cases where the sale is actually made by weight.

In some of the States special contracts may be made which specify some other method of sale than that required by statute.

In States where the legal weight of a bushel of any commodity has not been established and the laws do not provide that dry commodities be sold by weight, any checking by the housekeeper must be done by dry measure. (Ref. No. 16.)

TRADE CUSTOMS AND MARKET CONDITIONS.

Certain trade customs tend to foster ignorance of the best season for each vegetable and the best way to use it. A premium has been placed on bulk rather than quality, size rather than flavor. Why should not summer squashes and cucumbers be sold by weight as

well as winter squashes? Most of those in the markets now are overgrown. Asparagus 8 or 10 inches long is less desirable than if it had been cut a day earlier at half the length. The custom of keeping asparagus fresh in water increases its weight by absorption of water, but causes loss of nitrogenous and mineral matter. Celery should not have its roots spoiled by nails or its stalks bound with colored strings.

The medicinal qualities of vegetables need fuller investigation. Money spent for scientific research in establishing or refuting traditional and popular ideas about the effects of celery in rheumatism, onions for sleeplessness, etc., should give good returns. Probably in most cases green vegetables and salad plants would prove more useful than "spring medicine," in which so many have faith.

There are times when it is justifiable to pay a larger price for a food than its actual nutritive value seems to warrant, because its attractive appearance and flavor will make palatable the more familiar and less costly foods.

The wise buyer knows the nature of each article so well that when strict economy is practiced decayed vegetables are refused, while those only slightly withered but so unattractive as to be low priced are secured and promptly freshened.

The prices of vegetables in city markets seem exorbitant to those who have never had to pay cash for such products, and make the advantages of the home garden more fully appreciated. Too often in the country the garden is neglected that "money crops" may have more attention because its economic value is not recognized. If a garden plat is intelligently arranged and its products are properly prepared for the table, it often yields more profit than any corresponding area on a farm. Many a small garden, a quarter acre or even less, wisely arranged will bring to the family table more food than could be secured by any similar expenditure of money and labor.

At the present time the list of vegetables which may be easily grown is a long one and is being added to as new plants are found or new varieties produced. Some of the novel plants recently brought to this country for experiment by the Department of Agriculture are the "udo," a salad plant from Japan, Hungarian paprika, the dasheen, and the adsuki bean.

The future, judging from the recent past, will give increased facilities for the preservation and transportation of all types of vegetable products from every part of the world. Many plants now little known will be studied, improved, and made available. Fewer seeds and less cellulose or fiber will remain in many of the plants now in common use. There will very likely be greater concentration of the valuable constituents of such foods for convenience in transportation and preservation, but none of the improvements are likely to change

the fact that the vegetables are at their best when the interval between their picking and their use is the shortest possible.

EXERCISES, LESSON XV.

Materials needed.—Pencils and paper.

Exercise.—Plan menus for single meals or longer periods containing a wide variety of vegetable products and supplement any deficiencies of nutritive value by other additions.

Review any processes needing further attention.

Take this opportunity to test initiative of students in the preparation of any novel vegetable products available at the time.

REVIEW QUESTIONS, LESSON XV.

1. Tell all you can of the weights and measures commonly used for the sale of vegetables.
2. Are there any improvements that you can suggest in market customs?
3. How many varieties of vegetables are attainable in your vicinity from garden or market?
4. Are there any vegetables available which are not used in your household, and why?
5. What means have you employed to make any vegetable more popular on your family table?
5. Mention cases in your experience when vegetables were unpalatable because of careless methods of cooking.
7. What of the relative economy of animal and vegetable foods for your household?
8. Plan a menu for one week including as little meat as you think would be reasonable.
9. Compare the energy required to care for a home vegetable garden with that used in making cake, pies, and puddings.
10. What have you to say regarding the rational use of meats, vegetables, and desserts in planning wholesome meals?

APPENDIX.

REFERENCES.

[The books and pamphlets included in the following list are to be supplied by the State agricultural college for the collateral reading indicated by the specific references given in the text of the bulletin.]

1. Canned Fruits, Preserves, and Jellies, by Maria Parloa. U. S. Dept. Agr., Farmers' Bul. 203.
2. Potatoes and Other Root Crops as Food, by C. F. Langworthy. U. S. Dept. Agr., Farmers' Bul. 295.
3. The Food Value of Corn and Corn Products, by C. D. Woods. U. S. Dept. Agr., Farmers' Bul. 298.
4. Canning Vegetables in the Home, by J. F. Breazeale. U. S. Dept. Agr., Farmers' Bul. 359.
5. Canning Tomatoes at Home and in Club Work, by J. F. Breazeale and O. H. Benson. U. S. Dept. Agr., Farmers' Bul. 521.
6. Series of home-canning instructions. U. S. Dept. Agr., States Relations Service, Office of Extension Work in the South, No. A–81; Office of Extension Work in the North and West, Forms NR–22, NR–23, NR–24, NR–25, NR–26, NR–28, and NR–33.
7. Sugar and Its Value as Food, by Mary Hinman Abel. U. S. Dept. Agr., Farmers' Bul. 535.
8. Honey and Its Uses in the Home, by Caroline L. Hunt and Helen W. Atwater. U. S. Dept. Agr., Farmers' Bul. 653.
9. Chemical Composition of American Food Materials, by W. O. Atwater. U. S. Dept. Agr., Office Expt. Stas. Bul. 28, rev. ed.
10. Boston Cook Book, by Mary J. Lincoln. Boston, 1904.
11. Boston Cooking School Cook Book, by Fannie M. Farmer. Boston, 1914.
12. Principles of Cookery, by Anna Barrows. Chicago, 1912.
13. Bacteria, Yeasts, and Molds in the Home, by H. W. Conn. Boston and Chicago, 1912.
14. Chemistry of the Household, by Margaret E. Dodd. Chicago, 1912.
15. Textbook of Military Hygiene and Sanitation, by F. R. Keefer. Philadelphia and London, 1914.
16. U. S. Dept. Com., Cir. Bur. Standards, 1. ed., No. 55.
17. Dictionary.

LIST OF APPARATUS AND SUPPLIES REQUIRED.

APPARATUS FOR GENERAL USE.

[One each unless otherwise indicated.]

Stove with oven.
Scales.
Twelve glass jars, pints and half pints.
Quart measure.
Can opener.
Potato slicer.
Wire potato masher.
Frying basket.
Two to six kettles or stewpans.
Double boiler, 1 quart.

Double boiler, 2 quarts.
Dover egg beater.
Wire egg beater.
Food chopper.
Vegetable cutters of different types.
Chopping bowl and knife.
Mortar and pestle.
Molds.
Bean pot.
Pudding dishes.
Colander.
Microscope.
Blackboard and chalk.
Fruit funnel.
Dish pan.
Garbage can.
Box of labels.
Roll of paper.
Paper bags.
Twine.
Scissors.
Pins.
Dish towels.
Cheesecloth.
Paper towels.
Alcohol or oil for stove.
Iodin.
Ether.
Nitric acid.
Test tubes.
Filter paper.
Petri dishes.
Thermometer.
Sirup gauge.
Charts.
Thumb tacks.

APPARATUS FOR GROUPS OF FOUR STUDENTS.

[One-fourth as many of each as there are students in the class.]

Measure cups.
Tin or agate pans.
Tin or agate plates to cover pans.
Earthen bowls, 1 quart each.
Strainers to fit measure cup (fine).
Strainers to fit bowl (coarser).
Palette knife.
Saucepans.
Frying pans.
Graters.

APPARATUS FOR INDIVIDUAL USE OF STUDENTS.

[As many of each article as there are students in the class.]

Tablespoon.
Teaspoons.
Knife and fork.
Paring knife.
Notebooks and pencils.
Dishes and spoons for testing.

SUPPLIES.[1]

[Whatever green vegetables are available, as mentioned in each lesson, or any canned vegetables that will aid in the lessons when fresh vegetables are not available. Also the following, as required in the different lessons.]

Dry beans and peas.
Nuts.
Peanut butter.
Potatoes.
Squash seeds.
Olive, cottonseed, or other salad oils.
Vinegar.
Flour.
Sugar.
Butter.
Cream.
Milk.
Eggs.
Rice.
Tapioca.
Cornstarch.
Salt.
Pepper.
Spices, etc.
Tea.
Coffee.
Chocolate.
Vanilla bean.
Cream of tartar.
Soda.
Soap.
Sand soap.

[1] The class and not the college is to furnish these.